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JUNE 1999

Broadcast ENGINEERING®

THE JOURNAL OF DIGITAL TELEVISION

NAB'99

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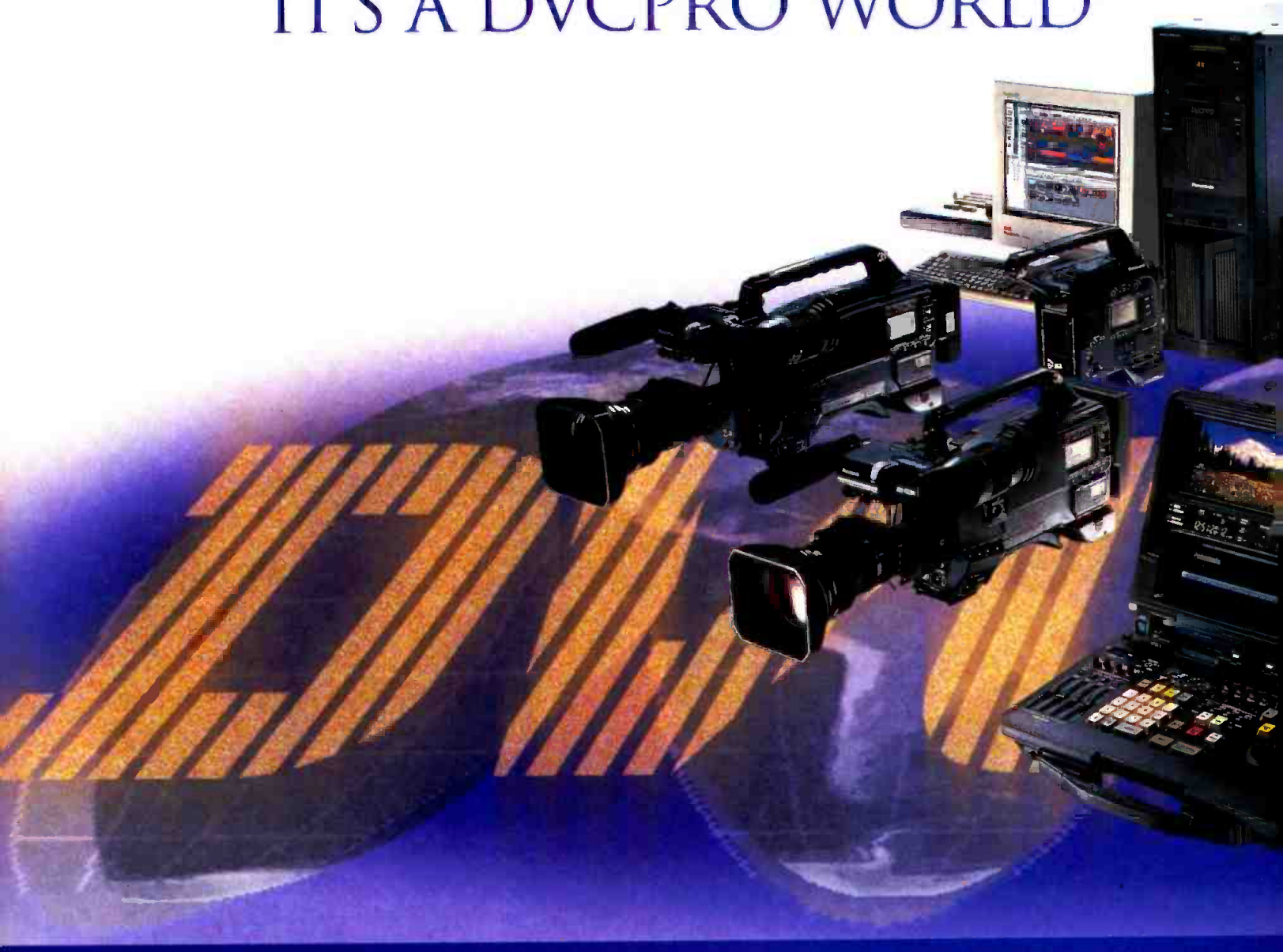

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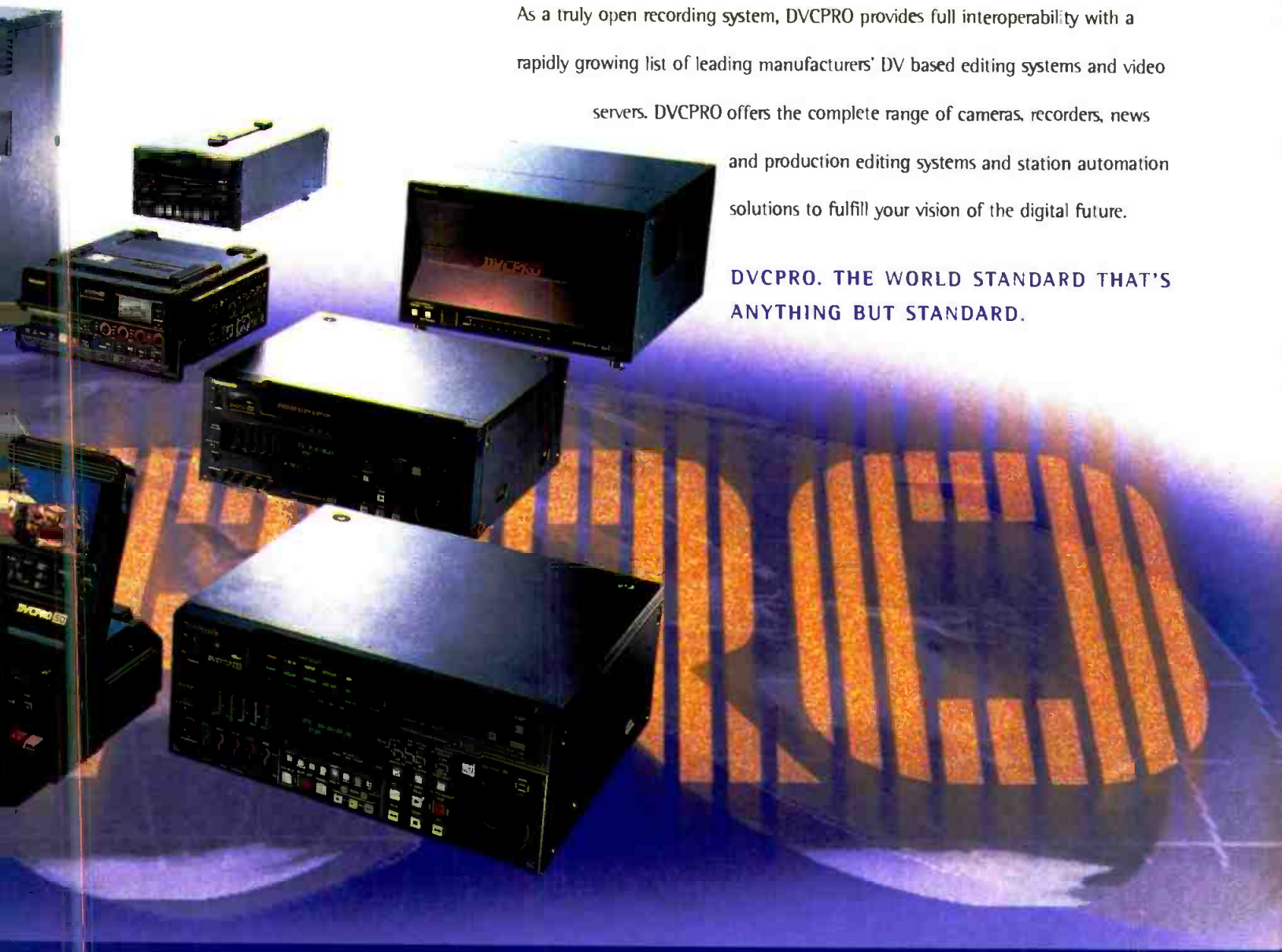

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Panasonic

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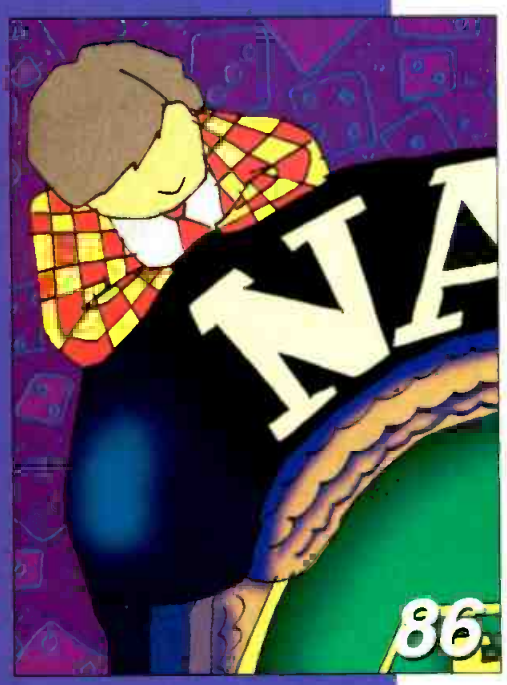
IN THIS ISSUE



Features

NAB review

Beyond the Headlines

NEWS

FCC UPDATE

EXPERT'S CORNER/VENDOR VIEWS

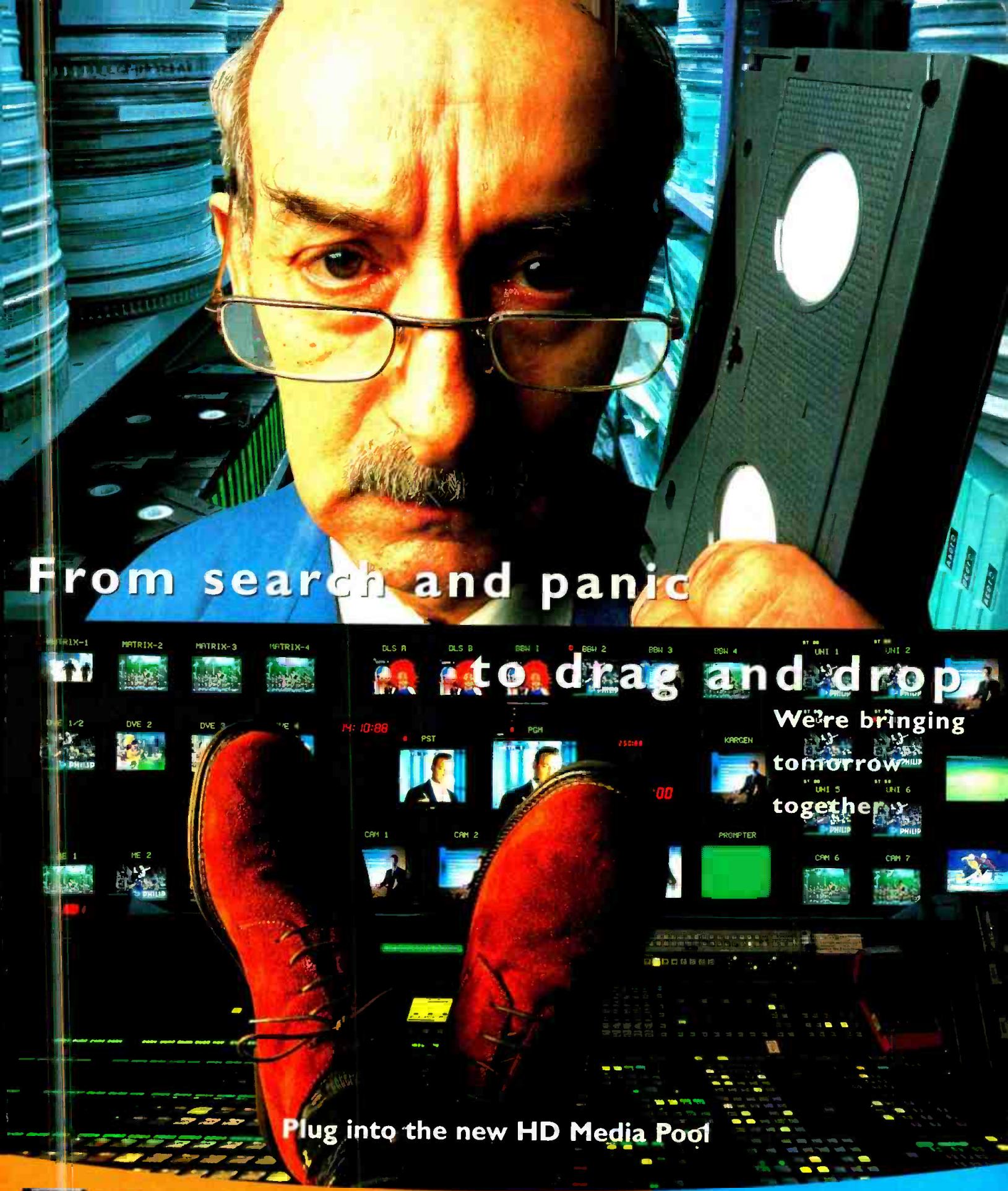
Digital Handbook

TRANSITION TO DIGITAL

COMPUTERS AND NETWORKS

ASK DR. DIGITAL

(continued on page 8)



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Questions? Contact:
Jim Saladin
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FREEZE FRAME

A look at the technology that shaped this industry.

Do you remember?

Broadcast Engineering **has long supported the best possible DTV transmission scheme. In what month and year did *Broadcast Engineering* magazine call for a halt to DTV standardization until full-scale test of COFDM could be completed. Correct entries will win a *BE* T-shirt. Send entries to: brad_dick@intertec.com.**

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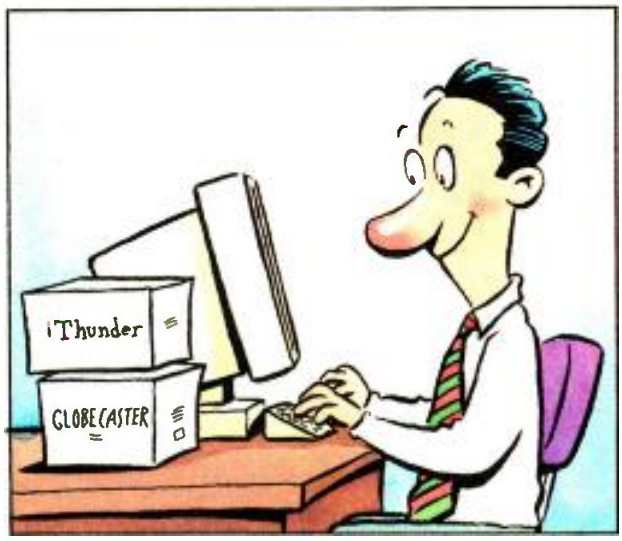
Editorial

Professional Internet tools for broadcasters

In case you missed it, maybe because you spent most of your time looking for HD solutions, *Internet* and *interactivity* were the key terms at this year's NAB. I know it sounds strange to be discussing the world's largest "broadcast" show in terms like these, but this year's assemblage was more focused on new types of services for broadcasters than in the past.

Sure, there was plenty of news and an overabundance of products on the TV side of things. There were new HD cameras, lenses, storage and editing tools for those wanting to dabble in HD. Truly mature products on the SD side of things were everywhere. A minor show, of sorts, was evident in the new HD add-ons from a variety of vendors. Screen bugs and logo generators for HD were widely seen. One vendor even showed a HD motion logo product. While the traditional broadcast tools and tool-makers were predominant, there were some new kids popping up in booths too.



It wasn't that products to support Internet broadcasting and websites were new to the show, but this was the first time we've seen long-time, traditional broadcast vendors bring such products to market. Internet servers, editors and switches for Internet applications were evident not just in the Sands but the LVCC too. It was largely the presence of such Internet products in the traditional broadcast venue that was so encouraging.

What was most fascinating wasn't that some traditional broadcast vendors showed up with Internet products, but that these products were built around traditional broadcast technology. It was that these players clearly recognized that serious delivery of video and audio to the Internet requires equipment more akin to broadcast hardware than to desktop computers.

Some of these new products allowed not just the coupling of video to the Internet, but also editing, browsing, storage and Web page production. Some of the larger systems allowed the production of traditional on-air graphics and programming, with the simultaneous and automatic generation of matching website products. For the first time, we see those who understand video developing products that broadcasters can use to deliver content to the Internet. No longer are TV stations and producers forced to kluge together QuickTime-like toys to develop, produce and deliver video to their viewers.

As stations seek to repurpose their expensive locally generated material for the Web, finding familiar broadcast tools to do so will be warmly greeted. Now if we could only get the telcos and PC-types to understand that 3fps isn't real video.

Brad Dick

Brad Dick, editor

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Reader Feedback

From the camera's viewpoint

There's one sentence in your March issue with which many directors, cinematographers, and editors would most profoundly disagree. It's in Rob Willox's piece on aspect ratios:

"From a technical and creative viewpoint, it is far easier to derive a 4:3 picture from a 16:9 original than to format convert a 4:3 picture to a 16:9 widescreen image."

For the creative side of the entertainment industry, exactly the opposite is true. Compositions that are filled out with fluff on the sides lose impact. It's usually far easier to tighten on the top and bottom to get a reasonable new vertical balance in the composition. In normal storytelling, characters tend to enter or exit through the sides of the frame rather than the top or bottom. Editors cut on entrances and exits. Keeping common sides solves the editorial problem completely.

Here at Paramount, we discussed this issue with our cinematographers and editors, and did extensive tests. The resulting policy is that we make 1.33:1 the big picture, and when it becomes necessary, we will derive 1.78:1 from within it by doing a dynamic tilt and scan.

That's why the 24-frame progressive 1080 line system is important to us. We'll do an anamorphic transfer, mapping 1.33 into the whole 1920x1080 grid. That will be our working and archival format. Downconversions to 1080i or 720p would come from 810 of those original progressive lines, yielding as good a picture as could be made in those native formats.

JOHN SPRUNG
DIRECTOR OF TECHNOLOGY
PARAMOUNT TV POST PRODUCTION

Sony's response:

John Sprung makes a very important and certainly a valid point. But it is a different point to the one we were making. John is speaking to the issue of

shooting on high-resolution film or HDTV (widescreen by definition). He is therefore totally correct in his observations. Both of these high-resolution formats fully facilitate the dynamic tilt and scan that John advocates. This is a good solution to the troublesome dual aspect ratio dilemma.

We, on the other hand, were speaking to the broadcasters dilemma – in the context of standard-definition (SDTV) electronic shooting – as they transition from the traditional 4:3 aspect ratio analog world to a DTV world encompassing both 16:9 and 4:3 SDTV digital formats, in addition to the ongoing analog 4:3 NTSC format.

Shooting news or traditional television programming with a 4:3 standard-definition television camera CANNOT facilitate the subsequent reformatting to a satisfactory widescreen picture. In such circumstances, the only choices are:

(a) to portray the complete original 4:3 image within the 16:9 screen, leaving subjectively troublesome "bars" on the left and/or right portions of the widescreen display;

(b) To electronically "zoom" into the 4:3 original to create a widescreen "slice" which in turn throws away imagery top and/or bottom, while also reducing the already paltry vertical resolution of the 480 active line original.

While both of the above are choices open to the creative, both alternatives remain visually quite unsatisfactory. We therefore stress again that under the circumstances of dealing with dual aspect ratio SDTV, it is a far better choice to shoot the original in 16:9 widescreen SDTV.

First, the 16:9 display will be fully satisfied, assuming the broadcasters' learning curve of shooting in the new widescreen format is behind them (which should not take very long based upon European broadcasters' experiences over the past few years). Of course, the aesthetic challenge of "protecting" for the 4:3 image (that will later be derived from this original) is another of the new learning curves facing broadcasters, their independent producers, and freelance shooters. But, it can be done. Under this 16:9 shooting circumstance the later choice of how to handle this imagery on the 4:3 screen is more flexible. The entire image can, of course, be shown letterboxed – but here the "bars" issue must again be confronted.

Alternatively, the 4:3 can be "cut-out" from the original (with a further freedom to "pan" that selected cut. This provides a full screen image with all of the original resolution fully preserved. If the "protection" has been well implemented, then both 16:9 and 4:3 will be well served.

In the case of the HDTV variant of DTV, John Sprung's points are well taken. But then, HDTV is 16:9 by definition.

Best regards,

LISA YOUNG
SONY ELECTRONICS

March *Freezeframe* winners

Winners of the March, "Do your remember?" contest include:

Jamie Allyn Anako, Rochester,NY

M.L. "Pete" Deets, WMTV, Madison, WI (Pete still has a copy of the issue.)

The above winners received a newly-designed *Broadcast Engineering* T-shirt. You too can win a *BE* T-shirt by entering this month's contest.

See page 8 for this month's contest question.

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News

Tonight Show becomes first HD network program

BY LARRY BLOOMFIELD

With the words, "This program is being brought to you in high definition," Jay Leno launched the first nightly television program in both digital and 16:9, 1080i high definition on April 26.

This historic event, which originated from the network's Burbank Studio 3, marked NBC's, and network television's, first full commitment to regularly scheduled digital programming, not to mention the first in a high-definition format.

Many months of planning and preparation were involved, which included pulling the NTSC equipment out and installing the new Sony HD equipment. An easy task if the studio were dark, but this was not the case. Several weeks of the Tonight Show were done out of a truck parked next to the NBC Burbank studio.

Although NBC contracted with Sony to install the new gear, the ultimate responsibility of interfacing the miles of fiber and copper cables, and ensuring the program took the right transmission path and got to the right satellite in both ATSC and NTSC, rested with George Hamilton, NBC's HD project manager.

"The Tonight Show with Jay Leno" began taping at 5 p.m. PST and was edited in a newly equipped HD edit suite. The finished HD show was fed directly to affiliates via SBS-4 and transponder 6. The NTSC feed went to New York via AT&T fiber and then uplinked by New York to affiliates, all in time for its first airing just two hours and 35 minutes after the taping concluded.

"All commercials were upconverted from NTSC through the use of Snell & Wilcox converters," Hamilton said.

NBC engineer Marv Richardson works with Sony HDW-500 HDCAM VTRs in "The Tonight Show" edit tape area. The show is the first network offering to adopt an HD format. Photo by Concept: Benson & Rice. Courtesy of Sony.

"The graphics were upconverted from wide screen 601 with YEM upconverters." It is expected that commercials will be done in high-definition as the virtues of HDTV gain greater acceptance.

The NBC projects department installed the audio system last year. Hamilton said that the audio console in Studio 3 is capable of 5.1 audio, but the remainder of the Burbank plant isn't wired for that configuration yet, so the show was done in stereo. The audio was digitized at the output of the studio audio console with NVision equipment into the normal AES audio format. It was then sent to the tape room for recording and editing in this format along with the HD video as HD SDI. When the show was fed to the affiliates, the audio and video was MPEG-encoded by a Tiernan encoder to the 45Mb/s data rate for distribution by satellite to the HD affiliates.

Most of the studios at NBC Burbank are equipped with five cameras, with other cameras brought in as needed. In comparison, the new HD studio sports a total of 10 Sony HD cameras, includ-

FRAME GRAB

A look at the issues driving today's technology

Viewers are unlikely to see much "real" HD in early broadcasts.

Stations predict that most of their programming will be upconverted NTSC.

Upconverted NTSC	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	81-100%	Don't Know	None	Total
Initially	2.8	3.4	5.6	2.3	8.5	5.1	5.1	5.1	14.7	36.2	9.6	1.7	100
After a year	1.2	3.7	4.9	4.3	9.2	3.7	2.5	5.5	13.5	25.2	23.9	2.5	100

SOURCE: SCRI International www.scri.com scri@scri.com

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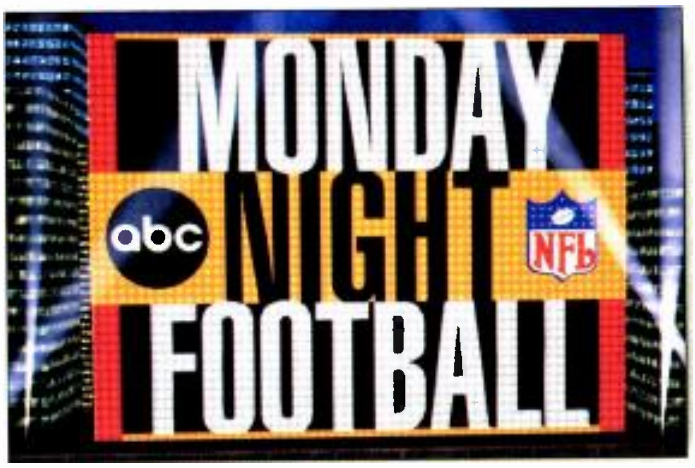
ABC's Monday Night Football goes HD

ABC-TV, in a joint statement with Panasonic Broadcast, recently announced it plans to produce and broadcast the traditional Monday Night Football games in high-definition.

"Live sporting events provide the best platform to demonstrate the viewing benefits of high-definition television," ABC-TV President Patricia Fili-Krushel said. "'Monday Night Football' – as the only live, primetime sporting event – offers the greatest opportunity to showcase HDTV to the American public. This is an exciting way to celebrate the 30th anniversary of 'Monday Night Football.'"

Panasonic is building and outfitting a 720p HD mobile production truck, which will travel to all 17 of the 1999-2000 season Monday night gridiron battles, one wild card playoff game and the Super Bowl. The truck will include both full-size studio and handheld portable cameras in the 720p format for the HD football broadcasts.



No sporting event would be complete without its share of tape machines. ABC plans to use Panasonic's AJ-HD2700 tape machines (D-5 format), which are selectable between the 720p and 1080i recording formats. Despite all this capability in the HD mobile unit, the HD telecasts will be produced and transmitted separately from ABC's regular "Monday Night Football" on the traditional analog network.

Nobody to date has talked dollars about any of the network deals, be they ABC, CBS or NBC. In exchange for the 720p HD equipment and production subsidies, Panasonic will receive a billboard announcement in the pre-game show on ABC's analog and HD telecast. Panasonic will also receive commercial time during the HD broadcasts.

ABC's "Monday Night Football" will begin its season on Sept. 13 with Miami at Denver. ■

USA Broadcasting launches master control center

The Barry Diller-owned USA Broadcasting is in the process of completing its new state-of-the-art broadcast facility in the Los Angeles area that will serve as a master control room for each of its stations. The control center will provide substantial savings in staffing and equipment costs and provide more resources for programming and station promotion.

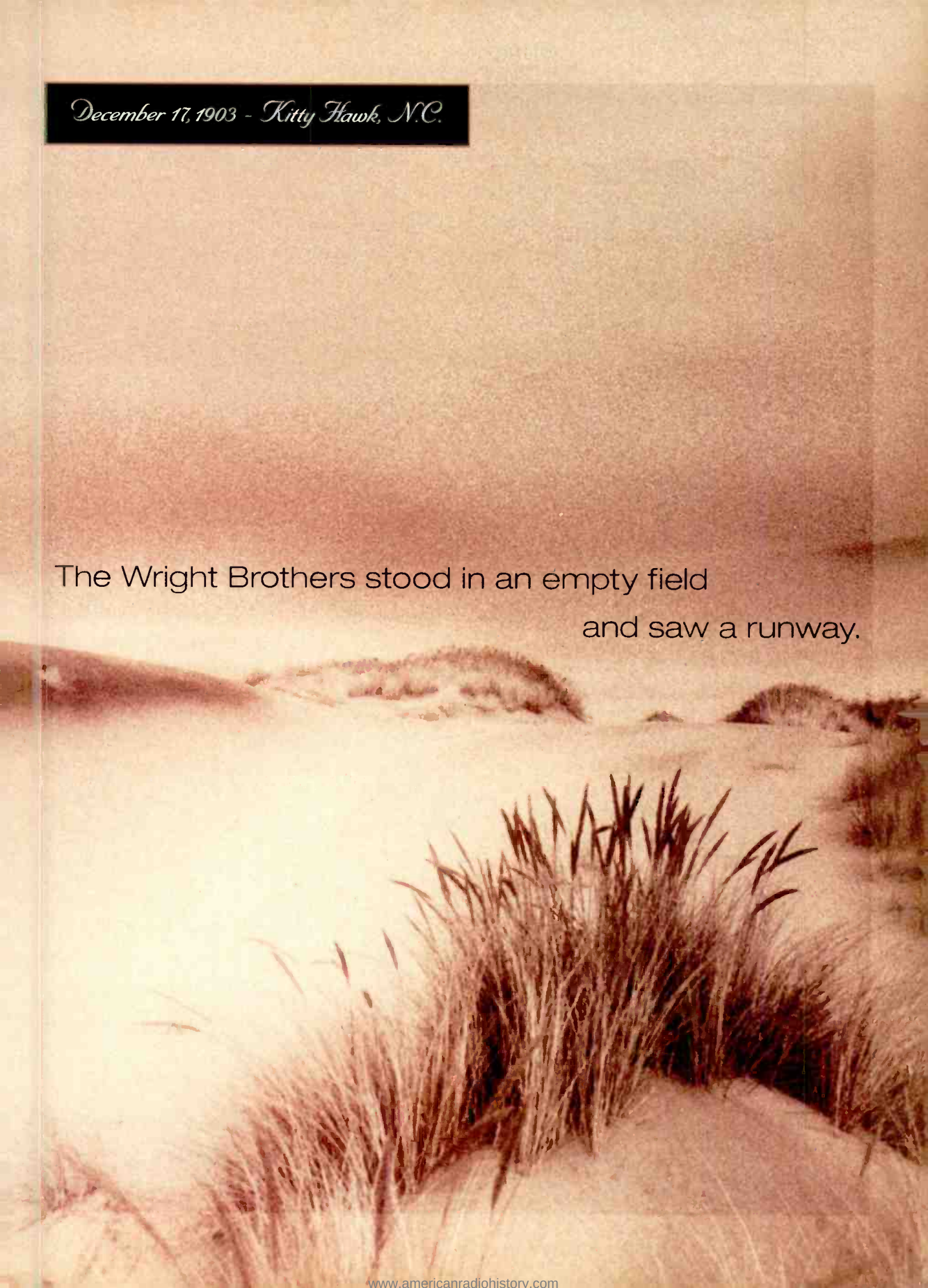
Seeing a measure of success with new programming at test station WAMI-TV in Miami, USA Broadcasting executives are getting ready to make the format, a mixture of local programming and nationally syndicated fare, a mold for all of their stations. Having the rights to local NBA and Major League Baseball games has helped to fill the schedule in Miami. If the network secures broadcast rights to sport franchises in other markets, the logistics of running 12 channels or more of this kind of live sports programming through their new Ontario, CA, master control could pose problems.

USA Broadcasting plans to provide programming for its stations from its new master control facility.

The timetable to implement this project through its master control as a single point of control for its multiple station operation will be over the next three years. USA would not say which markets it plans on hitting first. The first phase of this construction program will service five stations, and the second phase will serve five or more additional stations when completed. Plans are to implement this new programming model in three to four new markets, such as New York, Los Angeles or Dallas, in the next six to seven months.

The master control facility, which USA refers to as the "USA Broadcasting Station Works," will be up and running by this fall and will initially supply programming for up to five USA broadcast stations.

The new master control facility will provide each station with local programming, while reducing operating costs for individual stations. Howard Bolter, vice president of production and engineering at USA Broadcasting, estimates the centralized master control will save $8- to 10 million per market in equipment and staffing costs. Those savings could be applied toward promotion and programming. USA Broadcasting is planning to build a second similar facility next year to handle five more of its owned stations' programming needs. ■



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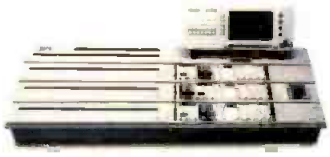

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SONY

Set-top boxes offer new possibilities for broadcasters

For many broadcast executives, the migration to digital includes an uncertain financial picture for their stations. At NAB99, many vendors shared their vision for a smooth and profitable digital transition: datacasting.

A number of exhibitors, mostly at the Sands, had products and services that push the frontier of digital broadcasting. Demonstrations consisted of technologies directly related to the "how and when" of television viewing with devices that can either be built into a television set or cloaked in a set-top box (STB).

Cable and direct-to-home service providers already take advantage of many of these features today. Broadcasters need to become familiar with them so they'll know where, how and why the features can be incorporated into their systems for the maximum return on their DTV investment.

Looking at the tops of most TV sets, this real estate is becoming more valuable with every new device that hits the market vying for space. Between cable boxes, VCRs, DVD players and electronic games, planning is an absolute must in the development of new set-top equipment. The combining of feature and legacy considerations must play an important role.

The most common features in today's STBs are tuners capable of receiving both digital and analog signals with baseband audio and video outputs. Since these devices cater to the analog world, the baseband outputs are necessary for both stereo components and S-Video, which gives higher quality pictures than the composite output. There is usually an RS-232 data port that can be used as a lower speed data port for connection to other consumer devices and troubleshooting. When the system operator offers pay per view or possibly connection to the Internet, a telephone modem could be a part of the STB for a return path to the headend. Mindport offers what is called an "IR Blaster" that allows STBs to function as an interface to a VCR, eliminating the second step of having to program two devices.

Most STBs incorporate the function of reception and also act as an integrated receiver decoder (IRD). Most will also have a "smart card" that gives each STB its own identity and allows the system operator to distinguish between users. The electronic serial number, which is part and parcel of the "smart card," is entered into a subscription management system (SMS). Through the SMS, broadcasters or operators can exercise a certain amount of leverage over the user's STB. It is the SMS and the conditional access signals embedded within the digital signal that permit viewers to see or be excluded from specific programs or services. Conditional access can be set up on a regional or other definitive basis, to grant viewers access to all or parts of the system, packages of programs or other marketing schemes.

Copy protection is an ongoing industry concern. Most of today's STBs incorporate features that prevent unauthorized copying of program material. Probably the most familiar aspect of today's STB is the electronic program guide, which gives the viewer the ability to click and tune rather than reviewing channel lineups or surfing.

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"OpenTV has the additional capabilities to allow for interactive applications such as weather, sports, home banking, home shopping, games, etc. The next generation of STBs will include most or all of these features and a lot more," said Mark Zisek, Mindport's product manager of STBs.

Many of the STBs, and the systems they support, will work with current television programming providers. For example, Philips TiVo allows subscribers to access special programming packages from entertainment providers such as Showtime, E! Entertainment, FLIX and HBO.

Several models allow viewers to select viewing preferences. The STBs can then select programs and provide programming via cable, antenna or satellite. These models, such as Philips TiVo, also recommend programming based upon the viewer's selected preferences or past viewing history.

Many vendors aren't exactly excited about sharing information about their next generation of STBs, but the more obvious features don't seem to be an issue. Most plan to include a hard drive that allows digital content to be downloaded into the STB for viewing at the viewer's convenience. NDS's XTV will be offering this feature. USB is a consumer electronic standard that will allow other devices to be plugged into the STB and have a common interface.

Future features include DOCIS modems and cable modems that will be built into the STB to allow for high speed Internet searching. Two variations are under consideration: one that will display the Internet on the TV screen and the other will connect to a PC.

Consumer polling is an important aspect of the new STBs. It will provide detailed statistics on what the consumer is watching. Zisek noted, "Savvy operators are beginning to demand more of advertisers, as they will have more information about viewing habits than ever before. We are working in this area, as we have capabilities in both the STB and the billing system. This will also have a big impact on the broadcasters."

With the FCC's recent decision permitting private ownership of STBs, standardization is a key issue. The closest thing to this is the DVB/DAVIC Interoperability Consortium, which is dedicated to setting standards for cable modems and interactive set-top boxes. Its membership consists of the who's who in the worldwide STB arena: Pace, Alcatel, Cocom, Comatlas, DiviCom, Hughes Network Systems, Nokia Multimedia Terminals, Philips Digital Video System, Sagem, Simac, THOMSON multimedia and its subsidiary THOMSON Broadcast Systems, with other manufacturers jumping onto the bandwagon regularly.

Current considerations by congress to permit the capabilities of local-into-local was one STB area not highly visible at NAB99. With this in mind, Thomson Consumer Electronics plans to manufacture and market a new line of local-into-local compatible receivers expected to be available by the end of the year. Despite the fact that the legislative process has not run its full course, Thomson engineers have started work on software and hardware upgrades that will be necessary with DirecTV's local-into-local option. ■

DTV reception

The final link in any television chain is in the display unit. Obviously, if there is a TV signal present, the first step to good picture, sound and data would be to capture as much of the signal as possible. Ensuring that the radio frequency (RF) energy gets to the TV set is a whole subject unto itself. With digital television, signal reception can be tricky.

Since cable systems have not started to carry digital television signals, terrestrial or over-the-air reception may be the only way a viewer might be able to receive one of the expanding ranks of digital television stations. It is not always possible to erect a mast with an antenna, so many viewers (for example, apartment dwellers) may have to settle for an indoor antenna of the type which have been dubbed "rabbit ears." Rabbit ear antennas bring up a whole new set of problems and issues. Since the entire receiving process is a chain and it is only as good as its weakest link, it's a good idea to have some answers when the engineering department of your station gets those phone calls on what to do.

Bud Tadiken, vice president of engineering at Microtune.

Bud Tadiken, vice president of engineering at Microtune, spoke recently about tuners, television set front ends and other issues related to receiving DTV signals. (See Microtune announces tuner breakthrough, page 24 *Broadcast Engineering*, March 1999).

One of the more important issues, said Tadiken, is the potential interference effects that will be seen when all allocated DTV and legacy analog channels are filled. "Already interference effects have been reported in Los Angeles and Japan, and right now only the major networks in the top 10 markets are transmitting,

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"The system is impressive and allows us to capture shots we could not get using traditional cameras and operators," said Mr. Gratteau. Every aspect of the Telemetrics Trolley System and Pan/Tilt devices can be controlled from any of the three production control rooms in the facility. "This was a critical component in the systems design," according to Mr. Gratteau. "Telemetrics custom designed their powerful Control Panel Software so that we could control the entire system from any of the three control sites. This provides us with a great deal of flexibility.

"Telemetrics was the most cost-effective of all the companies we spoke to. More importantly, Telemetrics was able to give us exactly what we wanted in terms of performance and features at a price we could afford," said Mr. Gratteau.

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often at reduced power levels," he said. "As the off-air spectrum becomes more and more crowded with channels, including adjacent, image and other taboo channels, the characteristics of a broadcast television tuner will have to more closely resemble those of a dual conversion tuner to avoid these interference effects. For this reason, I expect to see future TVs using dual conversion tuners as costs are reduced by silicon integration."

Multipath poses additional difficulties to overcome, particularly in urban areas. "Multipath effects are most prevalent in urban areas where tall buildings cause strong reflections," Tadiken said. So long as the difference in signal strength between the direct path and reflected path is sufficiently large, the digital processing in the demodulator ICs, combined with improved directivity antennae, should be quite capable of handling this issue."

Philips is working on a circuit that would follow the tuner section in a digital television receiver. This circuit would electronically exam the incoming signal and, where there are multipath components in the received signal, would lock to the most prevalent of the signals, remember where it is with respect to the other undesired signs, and pass one good clean signal for decoding. According to Philips, this is much easier to do in digital than analog.

"In an urban area, signal strengths are usually sufficient to penetrate building materials, so in these areas indoor antennae (rabbit ears) should be sufficient for DTV reception," Tadiken said. "However, in rural areas that may have fringe reception, indoor antennae are generally useless even for analog TV today. Fortunately, in rural areas there are normally no restrictions on erecting an outdoor antenna on a mast."

Tadiken suggested that a way of improving signal-to-noise ratio in a rural area is to use an antenna-mounted preamplifier or buffer. "This buffering prevents the signal losses in the connection from the antenna to the set from degrading the picture quality, particularly at UHF frequencies," he said. "An even better way to do this would be to mount a tuner on the antenna so that the much lower TV intermediate frequency (IF) would be used to connect with the set. This would minimize the losses and allow lower cost wiring or nonprofessional installation to produce satisfactory results. Of course, there are also very smart people out there working on improved antenna technologies."

Most television sets are connected to a chunk of copper with a cable system between them and either a direct feed from the TV station or an enhanced antenna system at the cable company's receive site. This does not always guaranteed the viewer will get the best possible signal-to-noise ratio at the RF input to the TV set, but what is delivered is a high level of what ever is on the cable system, noise included. With the concept that TV sets are virtually direct fed with a reasonably high-level signal (typically 10 microvolts), there has been little incentive on the part of set manufacturers to put a lot of design effort into the improvement of their sets' front ends. The technology is out there and this appears to be changing with the increase in off the air requirements of digital television sets.

For additional information see Microtune's website at www. microtune.com and the Philips Semiconductor website at www.semiconductors.philips.com. ■

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FCC Update

FCC revokes Trinity license

BY HARRY MARTIN

In a recent decision, the Commission, by a 3-2 vote, revoked Trinity Broadcasting's license for station WHFT (TV), Miami. The Commission's decision affirmed an ALJ 1995 ruling that Trinity had exercised *de facto* control over National Minority TV, Inc., a purportedly minority-owned company, and that the principals of Trinity and NMTV abused the Commission's processes by using NMTV to evade the Commission's multiple ownership rules. At the time, Trinity was allowed to own a maximum of 12 TV stations but allegedly used NMTV to buy two others based on NMTV's minority ownership.

Although the Commission rarely denies license renewals, the outcome could have been much worse for Trinity. Its entire network of 12 full-power stations and more than 300 LPTV stations was potentially at risk. Nevertheless, the Commission concluded that the loss of one station (WHFT) was an adequate and appropriate deterrent against future violations.

The Commission's Trinity decision provides a strong warning signal that the FCC takes its minority policies seriously and that misrepresentation and/or attempts to circumvent the Commission's ownership rules will not go unpunished. Any broadcaster who violates these policies runs a substantial risk of having their license revoked. The decision also indicates that, with respect to any pending requests to obtain an extension of a construction permit under the Commission's former rule (including appeals), the FCC now is applying a strict standard for obtaining an extension.

FCC assesses heavy fines

The FCC fined a station in Washington $19,000 for, among other things, failing to keep its tower lit and painted. In addition, the FCC recently issued fines against other stations around the country for failing to maintain limited power, failure to test equipment regularly, broadcasting a telephone conversation without authorization, and broadcasting inadequately censored indecent material.

In its recent fines for technical violations, the FCC determined that lighting or transmission problems existed at individual stations and inspected the stations. In every case, the Commission found additional noncompliant items for which it issued fines. In the Washington case, the FCC determined that the station's tower lights were not working and entered the station. The FCC agents determined that, in addition to the tower lighting, the paint on the tower was faded and chipped. Further, the agents inspected the studio equipment and found that Emergency Alert System (EAS) equipment had not been installed and that remote control and metering equipment had not been installed. The FCC fined the station $19,000 for these violations.

During similar investigations, FCC agents fined a Florida station $7,000 (finding a failure to keep a public inspection file available, failure to conduct performance measurements and failure to test and meet EAS requirements) after a report of parasitic emissions. A Mississippi station was fined $10,000 for operating with too much power as well as for inaccurate station logs, ineffective system monitoring, and a lack of fencing around its tower.

The FCC also has fined several stations for the content of their broadcasts. A Virginia station and a California station (which rebroadcasts the syndicated programming of the Virginia station) were fined for broadcasting a telephone conversation with a caller who was incorrectly told that she was put on hold. The caller settled a civil suit with the station that arose from the incident. However, the FCC stated that the resolution of the civil suit had no bearing on the violation of FCC rules. In another content-related fine, a Rhode Island station was fined $7,000 for ineffectively bleeping indecent words from a conversation. The FCC found that a bleep in the middle of a clearly recognizable word, combined with the context within which the word was used, resulted in a violation of the indecency rule.

Auction rules affirmed

In an order released April 20, the FCC affirmed the following provisions of its program, first approved in August 1998, for the use of auctions to resolve mutual exclusivity among commercial broadcast applicants:

· Auction processing of applications which already have been through full hearings was affirmed.

· The FCC rejected requests for reimbursement of expenses by applicants who counted on or who had already paid for hearing processing.

· The FCC affirmed that petitions to deny will be permitted only after an auction winner is selected. The deadline for such petitions will be 10 days after the auction winner's long-form application is accepted for filing. (Petitioners against an LPTV or translator winner will be afforded 15 days to file.)

·The FCC changed the "new entrant" 35 percent/25 percent bidding credit award procedures by redefining "recognizable interest" for purposes of assessing the number of other media interests to mean any attributable interest.

Harry C. Martin is an attorney with Fletcher, Heald & Hildreth, P.L.C., Rosslyn, VA.

SEND Send questions and comments to: harry_martin@intertec.com

Dateline

Broadcast stations in the following states must file their biannual ownership reports on or before Aug. 1, 1999: California, Illinois, North Carolina, South Carolina and Wisconsin. The December 1998 edition of Form 323, which includes gender and ethnicity information, must be used by commercial broadcasters.

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The 2GHz ENG spectrum skirmishes

JERRY WHITAKER, BE CONFERENCE CONSULTANT

It may be reassuring to know that today, even in the era of lighting-fast technological change, there is at least one thing that never changes — the fight over spectrum. Then again, perhaps it is not very reassuring at all. The tug-of-war over the limited resources of the radio frequency spectrum, or at least the practical, usable portions of it, has been going on for decades. As new technologies have pushed the limits of creativity and personal communications — much without the benefit of wires — demands on the spectrum that broadcasters have claimed for decades have come under increasing challenge.

One of the more visible and important battles of late is the 2GHz ENG band issue. The fight has see-sawed back-and-forth as the varied interests involved made their arguments, debunked opposing arguments, and fashioned ways to deal with the final outcome, whatever that might be.

This month, two individuals who have been in it from the beginning, Dane Ericksen and Dan Shine, examine the 2GHz issue. ■

SEND Send questions and comments to: jerry_whitaker@intertec.com

The battle for the 2GHz electronic news gathering (ENG) band continues. In a Memorandum Opinion and Order and Third Notice of Proposed Rulemaking to ET Docket 95-18, the FCC has proposed reallocating 35MHz of spectrum to mobile satellite services (MSS), thus changing 2GHz ENG from 1990-2110MHz to 2025-2110MHz.

EXPERT

Dane E. Ericksen, P.E., CSRTE

A previous proposal would have shifted the 2GHz TV broadcast auxiliary services (BAS) band upwards by 20MHz and would have resulted in only a 15MHz net loss of bandwidth. However, Congress instructed the FCC to find another 55MHz of spectrum in the 2GHz band for auction purposes as part of the 1997 Balanced Budget Act. An even more draconian reduction in bandwidth, from 120MHz to a mere 70MHz, did not occur because the Society of Broadcast Engineers and others were able to show a further reallocation would impact the National Aeronautics and Space Administration, which uses 2025- to 2110MHz on a secondary, shared basis for Earth-to-space and space-to-space communications. Such sharing is possible with low-density uses such as ENG, but would not be compatible with high-density uses such as cellular, personal communications services and MSS. Impacted systems would have included the Space Shuttle, the Hubble Space Telescope, the future International Space Station, the GOES Weather satellites, Landsat and the NASA Tracking and Data Relay satellites (TDRS). The reallocation would also have violated treaty agreements the U.S. signed with the European Space Agency, Japan and Russia. All in all, it was a pretty impressive example of why Congress should not try to micromanage a technical regulatory agency such as the FCC.

Another bright spot in the rule making was the FCC affirmation that MSS entities must pay all relocation costs to move 2GHz TV BAS licensees to the new band plan. The most likely form of that new band plan now appears to be seven 12.1MHz-wide channels, although there is a possibility of an alternative band plan, discussed in a following paragraph, that would instead allow seven 14.3MHz-wide channels. Both plans will, of course, mean reduced deviation for links that elect to remain analog, or early conversion to digital modulation. However, according to a report filed by Walt Disney Imagineering Research and Development, it appears that practical DTV pickup hardware is still at least two generations, and probably a year, away. Unlike fixed, point-to-point TV BAS links that convert to digital modulation where the increased size, weight, power consumption and latency problems can generally be tolerated, TV pickup stations do not have such leeway. Indeed, the equipment the Disney engineers had to load into a helicopter for dynamic performance tests was so heavy (550 pounds) that a seat had to be removed from the helicopter and the flying time restricted because a full tank of gas could not be accommodated.

Another problem is that current FCC rules only specifically authorize digital modulation in the 6.5-, 18- and 31GHz TV BAS bands. However, a pending Petition for Rulemaking, RM-9418, filed by the Telecommunications Industry Association (TIA), would amend the FCC rules to also allow digital modulation in the 2-, 2.5-, 7- and 13GHz TV BAS bands, plus other changes, and it appears likely that the FCC will act favorably on at least the digital modulation aspect of the TIA petition.

The most surprising of the comments filed in ET 95-18 proceeding was a proposal by Celsat to share 2010- to 2025MHz with broadcasters (i.e., all of Channel A1n and a portion of Channel A2n). Celsat proposes dual-band handsets transmitting on both 890MHz cellular frequencies and 2GHz frequencies. Under the Celsat plan, TV BAS 2GHz receivers would be equipped with

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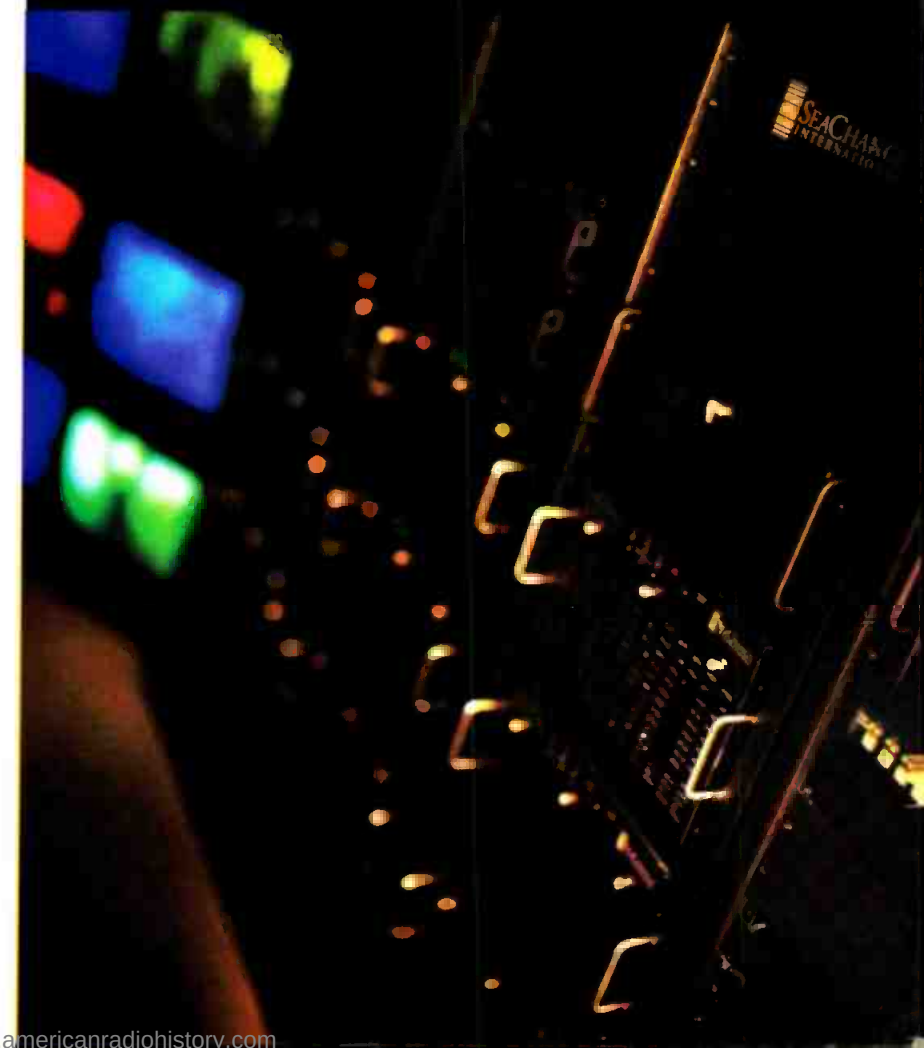

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2.2GHz "keep away" beacons. Dual-band handsets detecting a keep-away beacon on the downlink frequency would lock out 2GHz operation and only allow 890MHz cellular transmissions. Thus, in populated areas where broadcasters use 2GHz, but also where good cellular coverage exists, MSS subscribers would get service from conventional terrestrial base stations. But in remote areas where cellular service is lacking and where there would most likely be no 2GHz ENG receivers requiring protection, the handset would be free to transmit on 2GHz frequencies.

Under the Celsat proposal, broadcasters could end up with seven 14.3MHz wide channels instead of seven 12.1MHz wide channels, and such wider channels would be more conducive to reduced-deviation analog operations with two audio subcarriers. Further, 14.3MHz wide channels open the possibility of half-channel splits for digital operations. Although only standard-definition, heavily compressed digital signals would be possible in a 7.15MHz split channel, and that may be adequate for ENG feeds. ■

Dane E. Ericksen, P.E., CSRTE is a member of the SBE Board of Directors and is a consulting engineer with Hammett & Edison, San Francisco.

Equipment manufacturers have watched and waited for the final word on the 2GHz broadcast auxiliary band rechanneling for a number of years. They have spent a considerable amount of time and money working out solutions to speculative proposals. Now, it appears that we may be close to a final announcement and hope that this issue can finally be resolved. The following are some issues that are affected by reducing the bandwidth of the RF channels.

VENDOR

Dan Shine, Adaptive Broadband

The proposed reduction in channel bandwidth will have a profound affect on equipment performance if we are to continue with analog ENG. This is still under study, but we know that channel bandwidths of 12MHz or less will impair the ability to use multiple analog audio subcarriers above the video signal. Two audio subcarriers will be possible, but a third and fourth would be a problem unless digital audio techniques are employed. There also could be performance trade-offs with video filtering and video deviation.

The video filtering issues are not trivial. It is naive to think the video low-pass filter bandwidths can be narrowed to allow more room for audio subcarriers without degrading the group delay of the video filter/equalizer. This degradation produces ringing and chroma distortions that can not be corrected. Lowering the video deviation will decrease the video signal to noise proportionally. This is not desirable because of the normally low operating margins that exist with analog ENG. All of these issues must be addressed to keep the adjacent channel interference to acceptable levels. The question is how much are we willing to lower the performance bar for analog ENG operation? It is a very subjective question and each chief engineer or director of engineering tends to have a different answer.

The use of digital transmission techniques is an option that would produce acceptable video performance in less bandwidth. The cost of digital ENG equipment, as was seen during NAB99, is high and may be initially prohibitive in some markets. Digital ENG with COFDM technology does have some major advantages in that it is impervious to RF multipath distortions and has capabilities to transmit multiple video and audio streams. This may be the ultimate answer and its use will depend on the worth broadcasters put on the increased performance. This technology will allow the broadcaster to do ENG reports, sports and EJ in ways that were prohibitive previous to the availability of this technology. That may be worth a great deal to progressive broadcasters who use innovation to capture audience.

There have been some minor effects to business in general that can be attributed to the proposed change in the channel plan for the 2GHz broadcast auxiliary band. It is not the change itself but rather the length of time that the issue has gone unresolved. I am sure that all of the microwave equipment manufacturers have suffered some ill effects due to the indecision. For example, Adaptive Broadband (MRC) has comprehensive retuning plans for equipment in the field to deal with the channel reallocation, but we can not put the plans in effect until the final ruling is announced

Broadcasters are unsure of how to proceed with growth. We hope for a final resolution soon so that we can get on with the formidable task of equipment modifications that will lead to operational stability in the 2GHz broadcast auxiliary band. ■

Dan Shine is director, Advanced Products for Adaptive Broadband, Chelmsford, MA.

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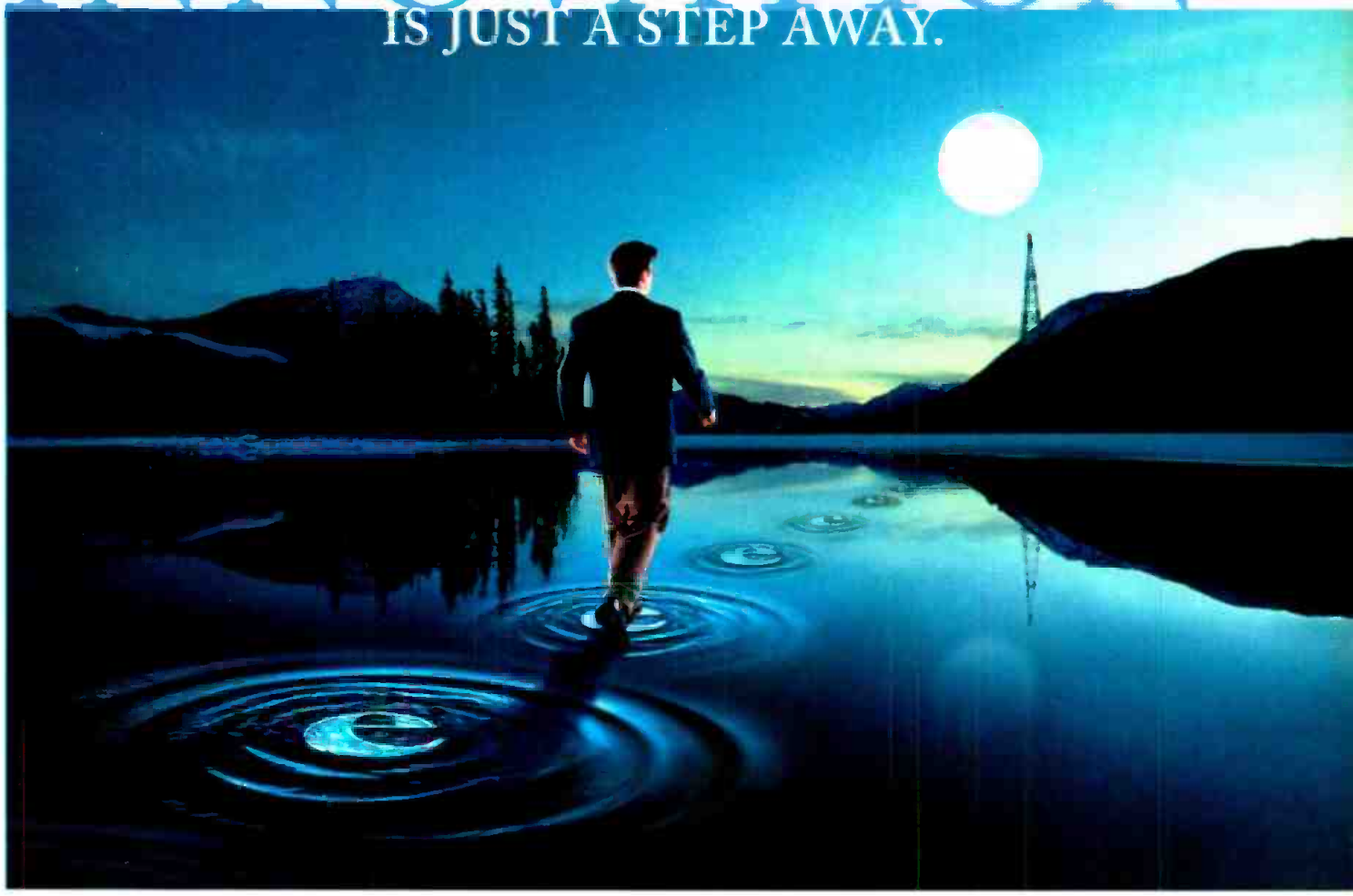

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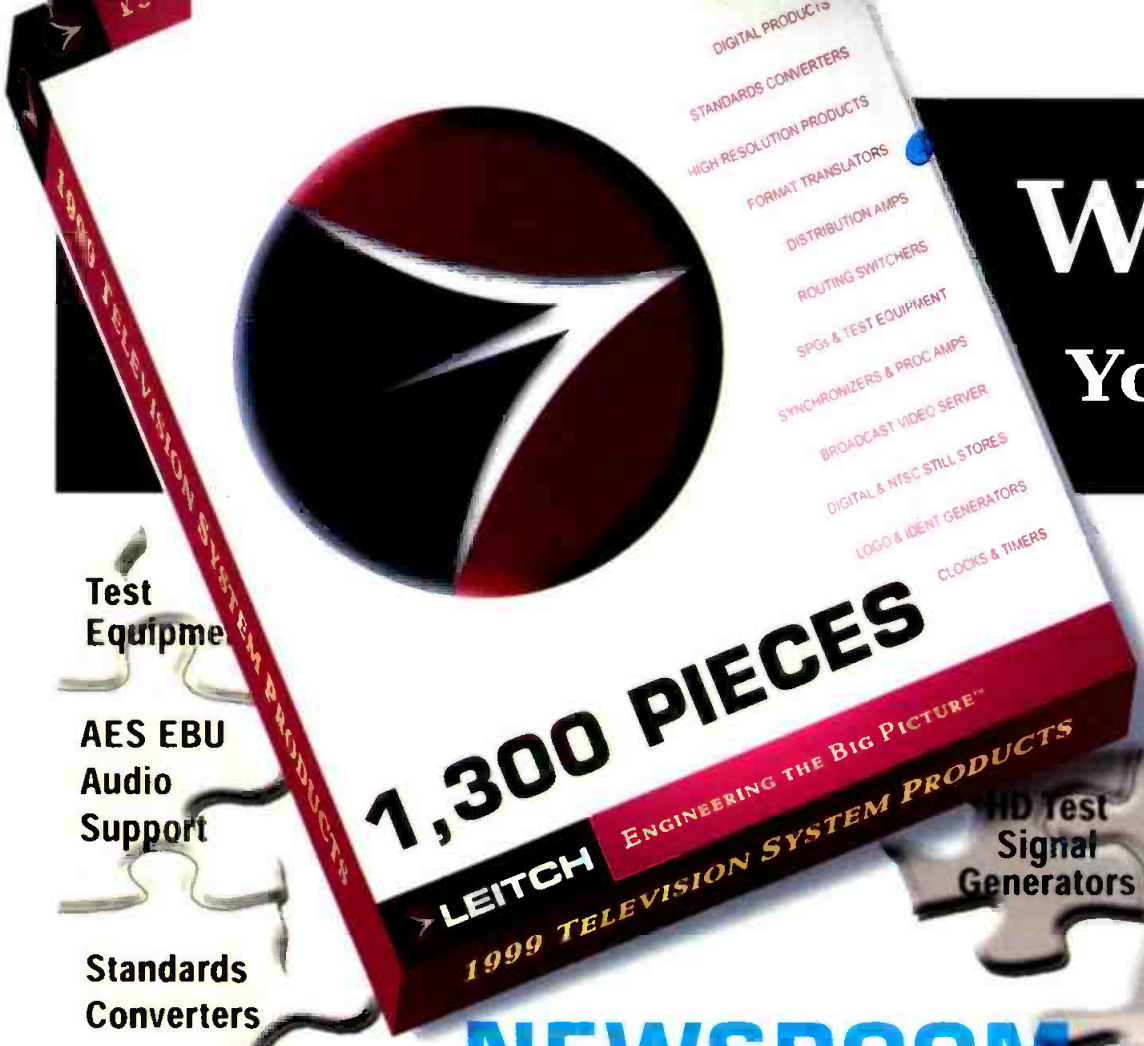

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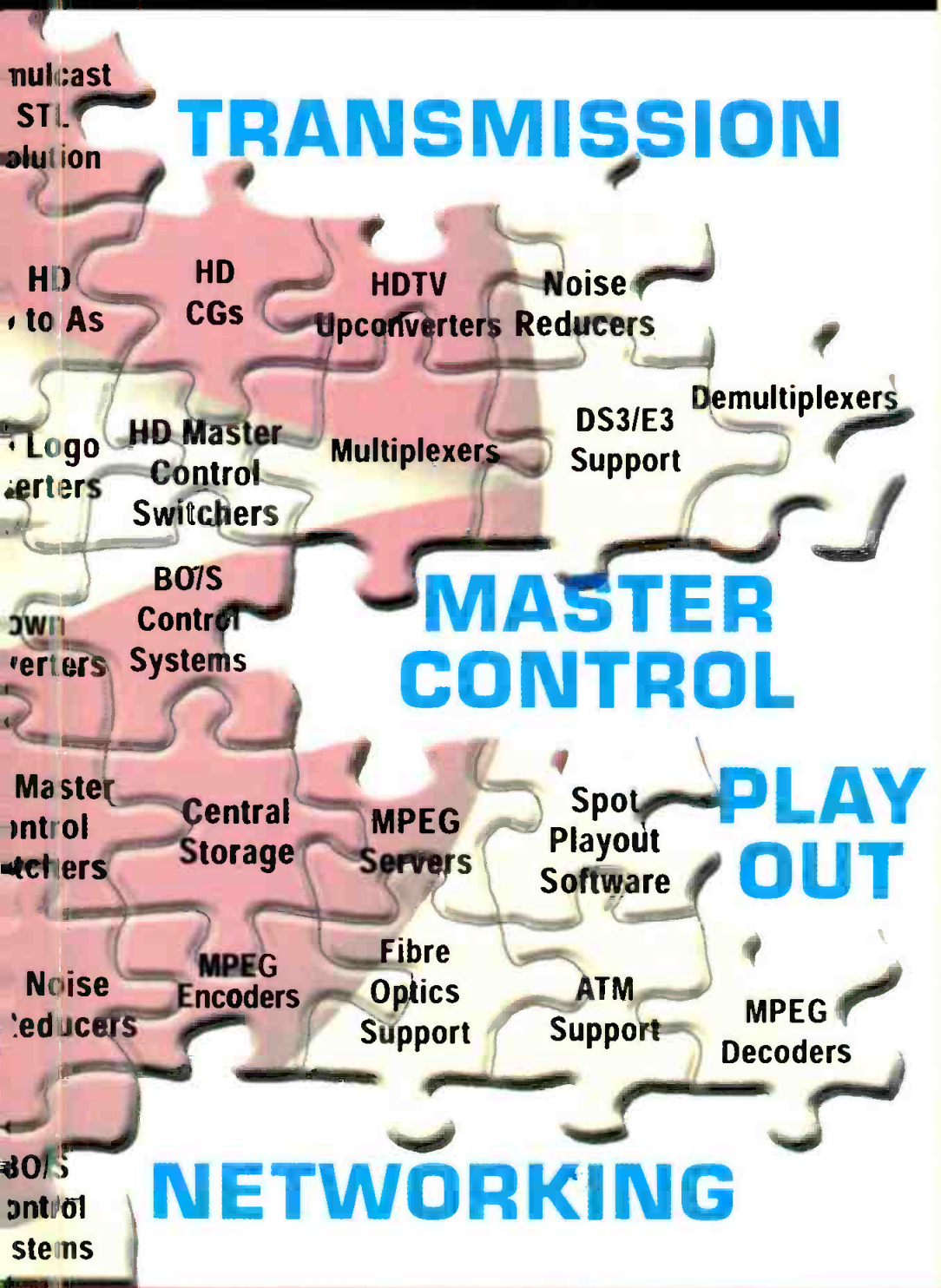

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Transition to Digital

Audio synchronization

BY MICHAEL ROBIN

In digital audio production environments, digital audio equipment may be used as stand-alone devices connected to other pieces of equipment via analog I/O ports. In this case no synchronization is required. However, when several digital audio signal sources are connected to a digital audio mixer using digital I/O ports, these digital sources must be synchronous. In digital video production environments, especially when the end result is an embedded audio signal, the synchronization requirements extend to audio/video synchronization.

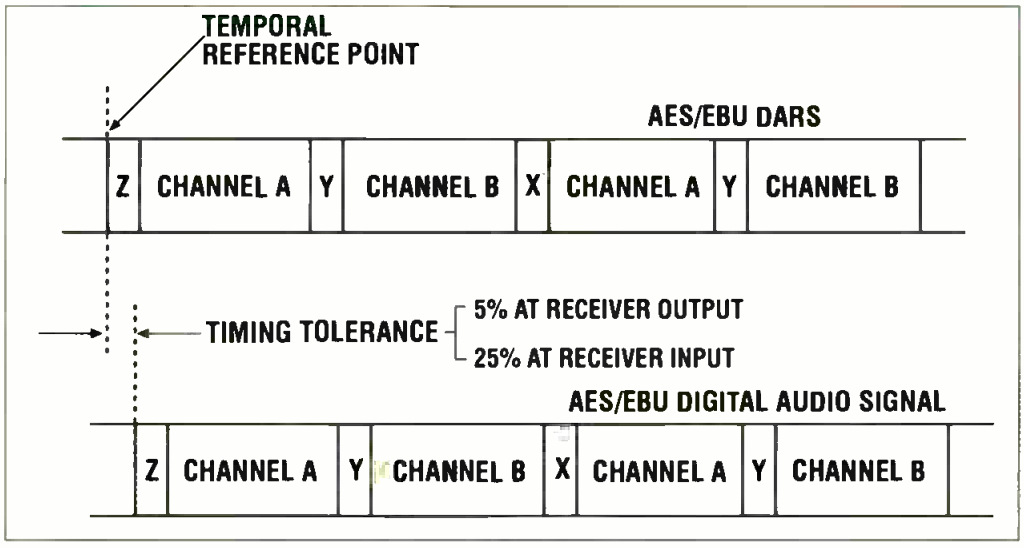

Figure 1. To be considered in sync, digital audio signals must be within +/-5 percent of an audio frame at the transmitter output and +/-25 percent of an audio frame at the transmitter input. The timing reference is the first edge of the Z or X word.

Digital audio studios

Digital audio signals are made of discrete samples. Mixing, inserting and assembling digital audio signals from a variety of sources requires the samples to be synchronized to a reference source in both frequency and phase. If the signals are not locked, clicks may be heard as one signal runs through a timing point with respect to another signal being mixed with it.

To achieve synchronization, a central synchronizing generator is used to feed each digital audio source with a reference sampling rate signal in a manner similar to that of a television studio. To this effect, a separate sync input is needed on every piece of equipment. The preferred method is the use of a digital audio reference signal (DARS). The DARS has the format and the electrical configuration of the two-channel AES/EBU interface.

Digital audio samples must be in phase with the DARS reference signal with a tolerance of ±5 percent of an audio frame at the transmitter output and a tolerance of ±25 percent of an audio frame at the receiver input. The timing reference signal is the first edge of the Z or X sync word. Timing is expressed as a percentage of the sampling period. Failure to synchronize and phase digital audio signals can result in pops and clicks. Figure 1 shows the timing difference tolerance with respect to a DARS.

When connecting external digital signals to an otherwise synchronous and timed audio studio or center, one of two conditions may occur:

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On chip frequency (MHz)	300	450	600	800	1000
Off chip frequency (MHz)	150	200	300	250	500
Cost/transistor	1	0.5	0.2	0.1	0.05

SOURCE: Jon Peddie Associates www.jpa.com

Photo provided by the NBA

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SONY

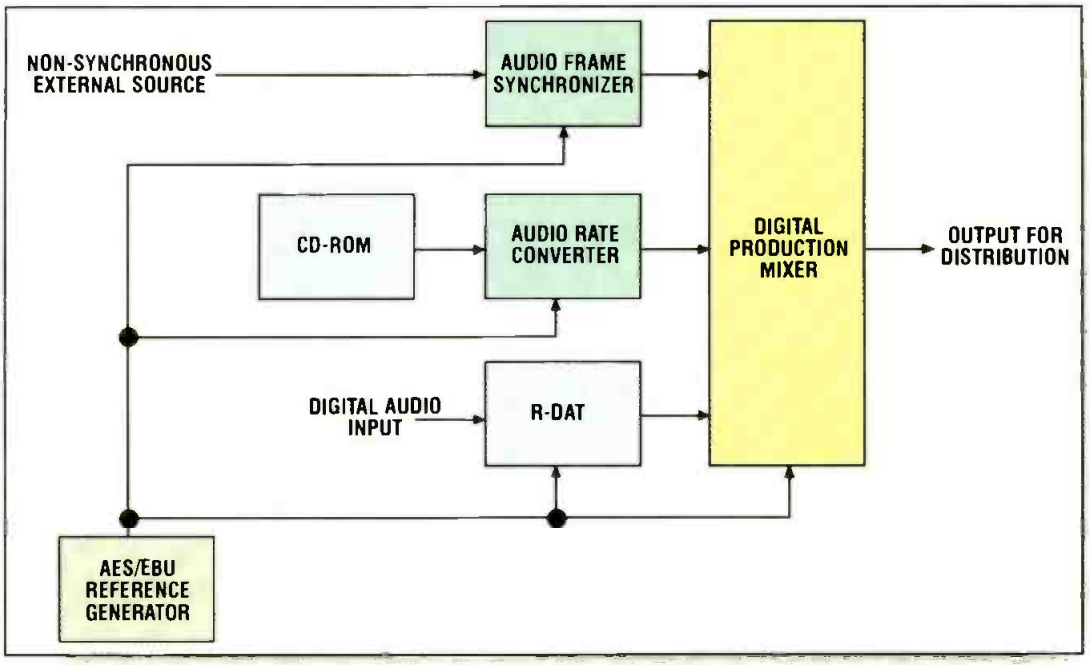

Figure 2. Digital audio studios are connected much like video facilities. The DARS signal is used in much the same manner as black burst.

• The incoming signal is nominally identical in sampling frequency but is out of phase with the DARS. In this case a digital audio frame synchronizer is required using the DARS as a frequency and timing reference.

• The incoming signal is not identical in sampling frequency. In this case a frequency-rate conversion is necessary.

Figure 2 shows a simplified block diagram of a digital audio production studio. A central DARS generator feeds several pieces of equipment to achieve synchronization and timing. Within this type of facility, there are several common points that need to be addressed. CD players use a sampling frequency of 44.1kHz. This requires an audio frequency-rate converter to convert the signal to the standard 48kHz sampling rate. External 48kHz sampling rate, nonsynchronous signals need to be audio frame synchronized to lock the drifting sampling rate to the DARS signal.

Audio/video production

In video production facilities, the distribution of digital video and audio signals can be achieved by routing them separately. Alternately, the digital audio signal can be mapped (embedded) into the ancillary data space of a bit-serial digital video signal conforming to the ANSI/SMPTE 259M standard for single coaxial cable distribution. The distribution of embedded digital audio signals inside a digital production facility requires that the digital audio and digital video signals be synchronous, i.e. derived from a common reference as well as precisely timed to allow for click-free audio and video switching.

The AES/EBU digital audio signal is organized in blocks, frames and subframes. An audio block contains 192 digital audio frames. A digital audio

frame contains two audio subframes each representing an audio channel (e.g. left and right). Each subframe is subdivided into 32 bits: four sync bits, four auxiliary bits, twenty audio bits and four utility bits (V,U,C,P). The dominant digital audio sampling rate in broadcast and video production applications is 48 kilosamples per second or a sampling frequency of:

$f_S = 48kHz$

The duration of an audio frame is:

$T_F = 1/f_S = 20.8333\mu s$

The duration of an audio block is:

$T_B = 20.83\mu s \times 192 = 4000\mu s$

Sampling the analog audio signal results in an NRZ AES/EBU bit rate of:

48 kilosamples/sec x 2 channels x 32 bits/sample = 3.072Mb/s

The NRZ AES/EBU signal is bi-phase-mark (BPM) encoded resulting in a data rate of 3.072 x 2 = 6.144 Mb/s. The sync words are not BPM encoded and have a data rate of 3.072/3 = 1.024 Mb/s. Each audio frame contains 64 bits (32 bits per audio channel) sent every 20.8333µs, hence:

Frame data bit duration = 20.8333µs/64≅325.527ns

One BPM bit-cell duration = 325.527ns/2≅163ns

Eye diagram unit interval (UI) = 163 ns/2≅81ns

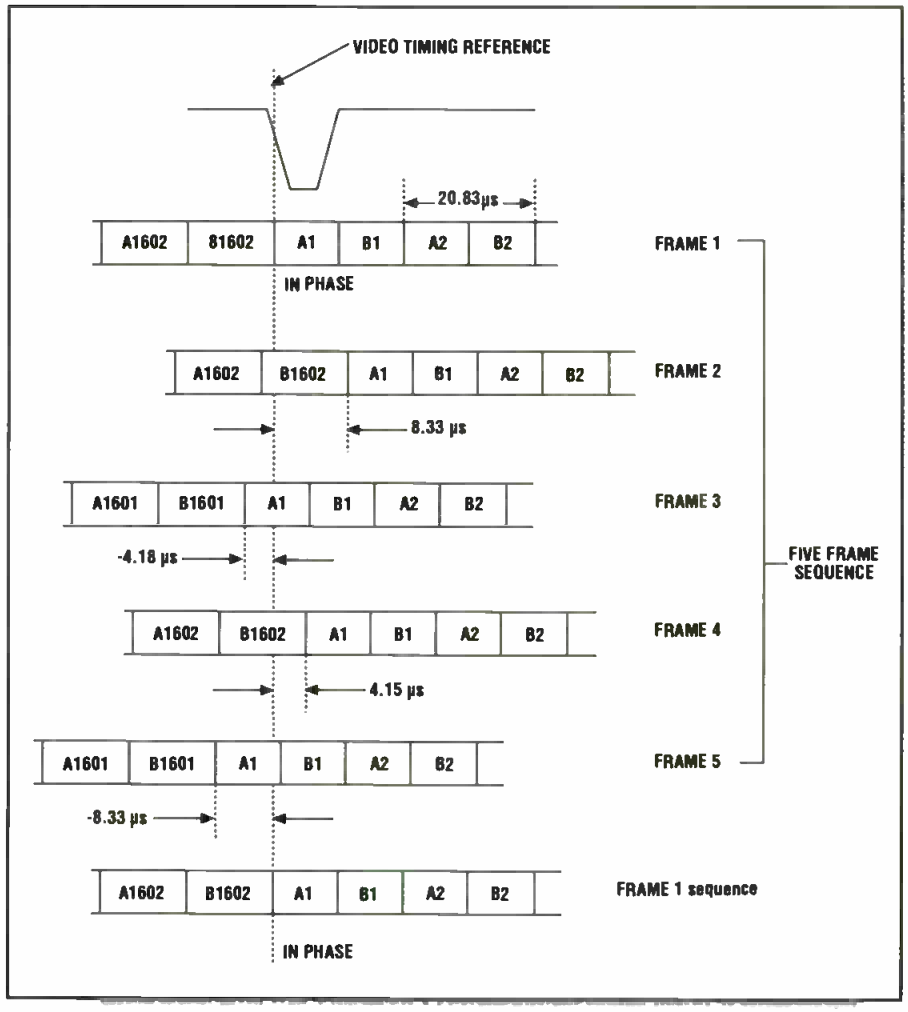

Figure 3. Because there is a nonintegral relationship between the audio frame rate and the video frame rate, the number of samples/frame varies in a predefined sequence. After five frames, the phase sequence repeats.

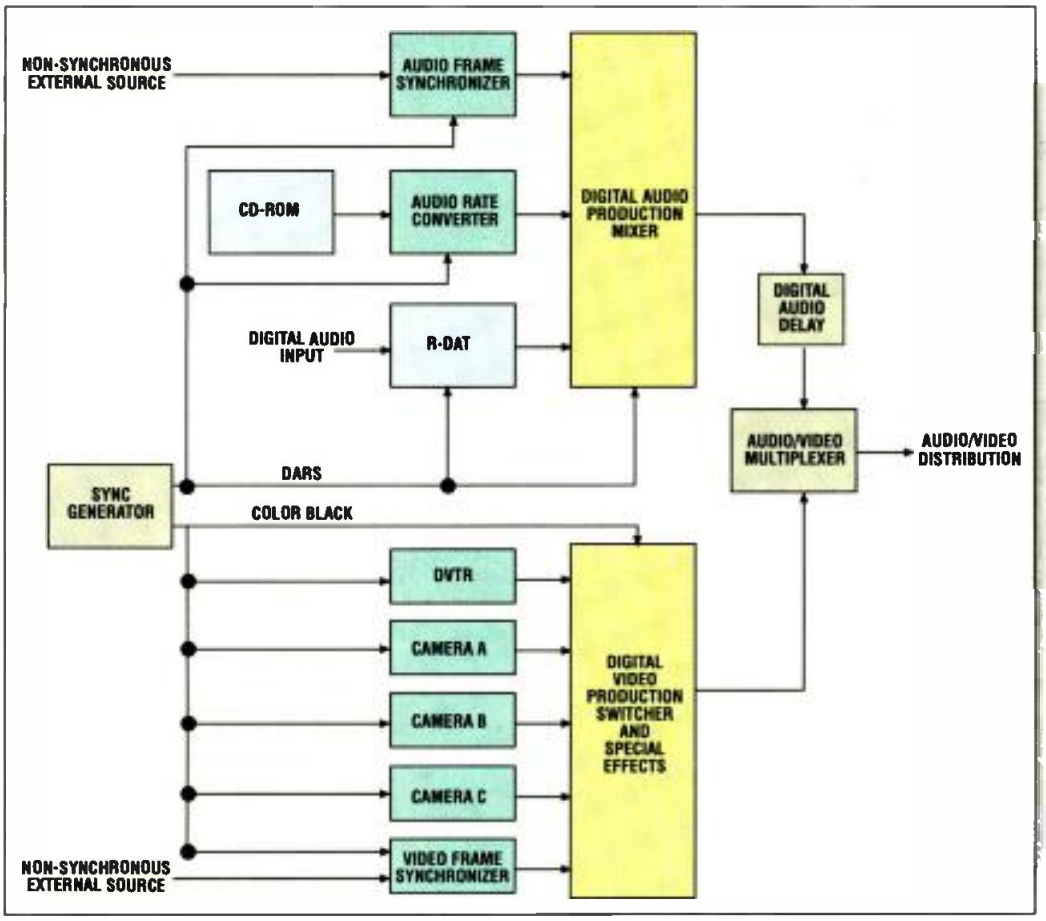

Figure 4. Within a digital audio/video facility, a common reference is used for both the video reference (genlock) signal and the DARS signal. In many cases, digital audio delays are needed to synchronize the audio and video signals after effects processing.

The number of audio samples per video frame is given by:

Samples/video frame = Video frame duration/Audio frame duration

In the 625/50 scanning standard the video frame duration is:

1/25 = 40,000.00µs

The phase relationship between audio and video signals can be easily maintained since the number of audio samples per video frame is almost exactly an integer:

40,000.00µs/20.833µs≅ 1920 samples/video frame

In the 525/59.94 scanning standard the video frame duration is:

1/29.97 = 33,366.67µs

The number of audio samples per video frame is not an integer but a fractional number:

33,366.67µs / 20.8333µs≅ 1601.6 samples/video frame

It takes five frames before an integer number of audio samples is obtained:

1601.6 x 5 = 8008

This results in 8008/(5 x 525) = 3.052 samples per TV line. As a consequence, most lines carry three samples per channel while some carry four samples per channel. To achieve this, five consecutive video frames will carry unequal numbers of audio samples, respectively 1602, 1602, 1601 (801 in field 1 and 800 in field 2), 1602 and 1601 samples. This results in a five video-frame phase sequence of digital audio and video which must be taken into consideration in the relative synchronization of the digital audio and video signal sources. After five video frames an integer number of 8008 audio samples is obtained. The relative timing of the audio vs. video reference point varies from frame to frame and returns to zero timing difference after five video frames. Figure 3 illustrates the five video frame digital audio phase sequence for the 525/60 standard.

In routing switchers, the switching of digital video with embedded audio occurs on line 10 of the vertical blanking interval (VBI). This switching disrupts the audio signal sequence. Faultless switching of embedded audio signals is possible if all signals, audio and video, are synchronized to the same central sync source. The sync source generates a video reference signal (e.g. color black) and a coherent DARS signal for distribution throughout the facility. The color black signal synchronizes all analog and digital video sources and the DARS synchronizes all audio A/D converters.

Figure 4 shows a simplified block-diagram of a digital production facility where digital audio and video signals are locked to a common sync source. Note that a digital audio delay is used to compensate for the video delay caused by the video production switcher.

All other equipment locked to this generator will produce the same audio-to-video alignment. Under these conditions the process of switching from one routing switcher source to another will generate no clicks. It is important to note that even though there is no switching click, switching between two signals having a different program content results in a discontinuity which may be subjectively uncomfortable. To avoid this effect, the data block number (DBN) sequence needs to be continuously monitored. In case there is a DBN discontinuity as a result of switching, the validity bit (V) needs to be reset to 1. This will warn downstream equipment of the occurrence of a switch and cause the audio to be faded to silence during the switching period, reducing the audibility of the switch. It is to be mentioned here that not all demultiplexers or D/A converters are capable of correctly handling the V bit. ■

Michael Robin, former engineer with the Canadian Broadcasting Corporation engineering headquarters, is an independent broadcast consultant located in Montreal, Canada. He is co-author of Digital Television Fundamentals, published by McGraw-Hill.

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The EBU/SMPTE Task Force Report – Part VI, Potential impact

BY BRAD GILMER

In the fall of 1998, the EBU/SMPTE Task Force published its report on the future of TV technology. This is the final article in a series that explores the report and its impact on the industry at large. Over the past few months, this column has focused on the different areas of the report – Systems, Compression, Wrappers and Metadata, and Networks and Transfer Protocols. This month's column takes a summary look at the report. It also examines the work that has taken place since the report was published and describes standards that have been put in place or are currently under development as a result.

Much of the Task Force's work concerned compressing and transporting program content as data around TV facilities. Because most facilities are not based on this type of technology, the impact of the report may not be immediate. However, for those anticipating using 4x real-time transfers, getting commercials via satellite, or building centralized origination facilities, their work will definitely impact your plans. Just as the standards written five to 10 years ago have paved the way for the conversion to digital, these new standards will have an impact on facility design over the next five to 10 years. The Task Force brought together an unprecedented number of technical experts from many different disciplines. Not only were some of the best and brightest people from the TV industry involved, but there were experts from the ATM forum and the Fibre Channel Audio/Video project. The computer industry was well represented with participation from Microsoft, Apple, Intel, Sun, SGI, Hewlett Packard and others. Telecommunications companies and equipment providers also participated, along with experts from the imaging section of the federal government. The group was strongly international, with delegates from Europe, Australia, Asia, and the U.S. Judging from the list of participants, this was truly a monumental effort.

One thing the Task Force made clear is that in five to 10 years, broadcasting (point-to-multipoint communications) will still exist. However, we can already see that streaming content (i.e. on the Internet) from one source to one receiver will also be a popular method of viewing program content (point-to-point). Along with these, file transfer of program material will also become more prevalent. There are several reasons for this. First, if getting content from one place to another is all that is needed, it can be done using unattended file transfers. Such transfers can be made without having someone feeding tapes one after the other, or having someone at the other end for recording and logging. Second, labeling the tapes and marking in and out points will not be necessary as this information and other metadata will travel with the program content itself. Also, because file transfer is a bit-for-bit guaranteed copy, if the file makes it to the destination, it is exactly the same as it was at its source — possibly making QC less of a concern. Finally, since file transfers can be made at faster or slower than real time, flexibility is increased.

EBU/SMPTE Task Force accomplishments:

- Creation of the Serial Digital Transport Interface (SDTI) standard
- Development of a System Model for compressed digital television facilities
- Initial definition of Metadata for television
- Issuing of a preliminary Metadata dictionary
- Standardization of "Metadata food-chain"
- Standardization of simple and complex wrapper concepts
- Development of a Reference Architecture for content transfer
- Public disclosure of SX
- Public disclosure of DVC-25, DVC-50, Digital-S, and DV-CAM
- Transportation of a number of compressed formats via SDTI
- Standardization of XTP, a protocol for point-to-multi-point transfers
- Perhaps the creation of the Pro-MPEG forum

The Task Force and SMPTE

The Task Force was a joint effort between members of the European Broadcast Union (EBU) and the Society of Motion Picture and Television Engineers (SMPTE). It was not charged with making new standards. Instead, it had the job of identifying standards to be written to assure program content exchange between digital compressed facilities. Once the work was complete, the Task Force passed on a list of recommendations for standards work to SMPTE. As a direct result of this effort, SMPTE itself underwent a major reorganization, with the new organization closely matching the structure of the Task Force.

Achievements

Here are some of the things the Task Force accomplished:

- resolved the conflict between two competing and incompatible proposals for transmitting digital data such as compressed MPEG pictures over the standard Serial Digital Interface (SDI). The basis for a new standard, the Serial

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Digital Transport Interface (SDTI) was formed. This is important because without a transport standard, it would be impossible to connect two MPEG systems. SDTI is now a SMPTE standard.

• developed an overall system model describing how the various components of digital facilities fit together. The Systems group addressed migration from existing facilities to the facilities of the future. SMPTE has set out to define the parameters for control systems, messages and other system elements, and is also working to develop a standardized object model approach for device control in the broadcast environment. They are also looking at ways to achieve bandwidth management of overall systems. (See Figure 1)

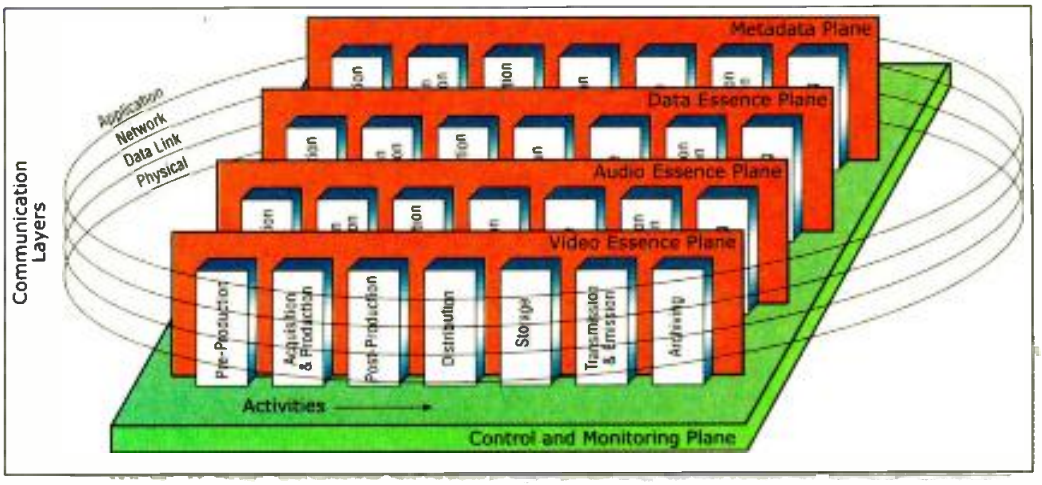

Figure 1. The Task Force system model defines areas, or activities, within a broadcast facility. The areas can be divided into planes such as video essence or audio essence. Communications layers as well as a control and monitoring planes are used to connect all the pieces.

• addressed, for the first time, the issue of metadata and how it was to be described and used in the broadcast industry.

• SMPTE has issued a ballot for a metadata dictionary. This document describes how a dictionary defining metadata should be built so that all users can check it for the definitions of metadata terms.

• SMPTE has now begun the task of standardizing the metadata food chain — the path metadata will take through facilities.

• developed and documented the concept of simple and complex wrappers. These wrappers allow users to group material together in the electronic world just as they do in the physical world. For example, all the scripts, show elements, contract rights, and EDLs for a show may now be stored together in a filing cabinet or on a shelf. All of these elements could be linked together in electronic form by using a wrapper.

• made available a reference architecture in a public forum that describes an approach to allow the interchange of program content in the digitally compressed domain.

• made available the workings of Sony SX in a public forum. While not all the details of SX were published, enough information was released to make some interchange of SX material a possibility.

• made available the workings of DV-based 25Mb/s and 50Mb/s compression schemes (DVC-25, DVC-50, and Digital S) in a public forum, and standardized mappings of these compression schemes onto SDTI.

• nearing completion on standardization work on the mapping of the DV consumer format (DV-CAM) into SDTI.

• in the process of defining how to map MPEG-2 4:2:2P transport streams into SDTI.

• SMPTE is also defining how to map MPEG-2 elementary streams associated with metadata (audio, system information, etc.) into SDTI (SDTI-CP or Content Packages).

• begun work on the transfer of DV across ATM networks.

• nearing completion on standardization work on the Express File Transport (XTP) protocol that will allow point-to-multipoint transfer of program content.

• Some have suggested that the Pro-MPEG forum, a group dedicated to providing interoperability between various providers of MPEG equipment, is an indirect result of the Task Force work. Given everything that the Task Force work enabled in the area of DV, some may have felt that this gave the DV approach a competitive advantage, and may have begun this concentration on assuring the same sort of interoperability for MPEG equipment. The work of the Task Force will not directly impact the majority of daily operations or decisions this week, or perhaps even this year. However, over time the standards that are being developed now will become the backbone of television and other rich media distribution facilities of the future.

If you would like to participate in charting the future of this industry, attend the national SMPTE standards meetings. All meetings are open to the public. Meeting notices are published on the SMPTE website at www.smpte.org under the Engineering section. Users are particularly encouraged to attend. If you have shied away from the technical committee meetings, concerned that you do not have the in-depth technical knowledge to make a contribution, do not be concerned. All that is required from users is their thoughts on how new technologies will be applied. Your contributions will be welcomed. ■

Obtaining a copy of the Task Force report

The Final Report is published jointly by the EBU and SMPTE. Contact the EBU or SMPTE and ask to be sent a paper copy (the EBU can supply a Special Supplement, SMPTE can supply a Journal) or download the .pdf document from the EBU website (www.ebu.ch/pmc_es_tf.html) or from the SMPTE website (www.smpte.org/engr/ebumeet1.html)

Brad Gilmer is president of Gilmer and Associates, a management and technology consulting firm.

Send questions and comments to: brad_gilmer@intertec.com

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Confused crosspoints

BY STEVE EPSTEIN, TECHNICAL EDITOR

At NAB I was discussing automation with Stephen Damas, an engineer from WGBH, and it seems they have had some problems with the interface between their Louth automation system and an old Utah Scientific AVS-2 router. Every now and then it would take and/or drop crosspoints; seemingly at random. The solution, as it turned out, was using a different version of the Utah control software. I checked with Doug Pierce at Utah Comteck Video, which handles the AVS series. Here is what he had to say:

The issue, which came to us from WGBH, Boston, was that wrong sources were being selected and/or random sources were being selected when Louth automation was controlling the system. There have been some reports from other customers with similar problems, but none to the extent WGBH was seeing. The main reason is WGBH runs two stations on one router. They have very heavy traffic or in other words, a lot of switches happening.

We went to work and investigated the problem by working directly with Louth and WGBH. After consulting with some of WGBH's engineers, we discovered that the control card software was a version that included the MRS-2 software. MRS-2 allows customers to make changes easily to the control system (control panels) or even burn PROMs. However, with this version of software running the control card (and because of some hardware limitations) the baud rate of the serial ports are slowed down dramatically. The Louth automation system needs to run at a higher baud rate than what the serial ports can handle to operate correctly.

The problem was solved by changing to a software version without MRS-2. This allows the serial ports to run at a higher baud rate, making them compatible with Louth automation. One of our customers was trying to run at 38400-baud rate. Reducing that to 9600-baud has eliminated the problem, but he has much lighter traffic on his router. It appears that customers with light traffic on their router can run at 9600-baud and they will be fine with the MRS-2 version software. Customers with a lot of activity on the router that are having problems running with automation need to change to a different version of software.

The drawback of changing to this version of software is that customers using the MRS-2 software to download to the control panels will need to change back to the MRS-2 software long enough to do the download.

Doug Pierce
Utah Comteck Video
(801) 524-9999

Dr. Digital responds:

Well, there you have it. If you have been having problems like this with older Utah routers, you might want to check with Doug and see if this solution can resolve your problem.

1720 bulb replacement revisited

In reference to changing the scale lamps on the Tektronix 1720 (*Dr. Digital*, May 99), Tektronix doesn't mention that the plastic lamp bases are almost always deteriorated from heat or that they crumble when you try to grip them. Metal tweezers don't work very well to grip the glass lamp envelope either. We use a short length of soft plastic tubing to hold the lamp while it is guided to the correct position to slide over the contact pins. I always thought it was ironic that with all the scopes Tektronix has manufactured over the last three decades, they never seem to come up with a good design for scale illumination lamps. We have had problems with every model we have encountered.

Bill Seabrook
WETA-TV
Maintenance Department

Dr. Digital responds:

Thanks for the info. I've had plenty of trouble myself. It always seemed you needed two sizes of tubing, one tight enough to grip the bulb and pull it out, and another loose enough that it won't pull the replacement bulb back out once it is inserted. I have seen a variety of bulb removal tools over the years, but none seemed to work well all the time. Sometimes slipping pieces of tubing (rubber or heatshrink) over the tweezer tips can help when trying to grip the bulb.

If you are having trouble with a product or manufacturer, or simply have a technical question. Drop me a note at *drdigital@compuserve.com.* ■

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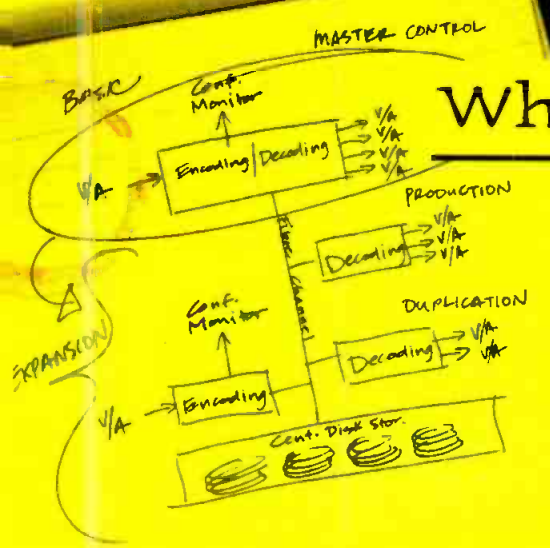

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SYSTEMS DESIGN SHOWCASE

PBS:

A television technology leader stays true to form

By Jim Seaman and Steve Lewis

The original PBS mission of providing superior TV programming has remained unchanged over time despite the dramatic transformation of television operations and the broadcast industry in the last 20 years. The PBS origination facility, located in Alexandria, VA, currently provides extensive network program feeds across seven time zones that are viewed locally through public member station broadcasts and other distribution clients such as DBS. To keep up to date as well as set the pace for the future, the PBS technical team has incorporated many innovative approaches, including numerous new systems. These facility enhancements provide increased media services to its 349 member stations and their nearly 100 million viewers.

PBS completed its latest facility makeover with the help of Communications Engineering Inc. (CEI), a turnkey broadcast design and engineering firm located in Newington, VA. The project developed and created a completely automated multichannel facility, which also initiated PBS' HDTV programming schedule.

Managing technical change within PBS' television facility begins with an analysis of existing operations including program acquisition, preparation, storage, origination and transmission

PBS' eight HP MediaStream servers are incorporated into a redundant design with one hot spare maintained for all shedules at all times.

PBS

ers. The embedded audio standard had allowed incompatible vendor approaches to develop which PBS endeavored to solve through product collaborations and consultations with Tektronix, Sony, NVision, Philips BTS and other manufacturers whose equipment was chosen by PBS. Solutions involved new firmware for some Panasonic and Sony VTRs and enhancements to the Philips audio mux/demux boards before the systems integrated together without producing sonic artifacts.

Multiple digital tape standards had emerged within the industry by 1993, but after careful analysis PBS chose Panasonic D-3 as its new in-house digital videotape standard. An interformat room was designed and built to process and transfer the range of analog and digital tape formats accepted by PBS onto D-3 for eventual transmission. The PBS library, which included—much one-inch tape and other analog material, began to use the D-3 format to store program assets in the digital domain. At the same time, 15 component D-5 machines were purchased with an eye toward an eventual ITU-R601 conversion of PBS and possible use of D-5 with mezzanine level compression for HDTV.

Since 1993, PBS origination has evolved to produce 18 program schedules along with the legacy C-band feed. The broadcast industry has made dramatic 'digital' product introductions in the last six years particularly centered on the serial digital component standard. The proliferation of vendor products produced economies of scale surrounding industry 601 SD component signals and pointed the way for PBS' most recent upgrade. As part of PBS's 1993 digital remake, it had considered HD alternatives, but decided against investing in any HD technologies until ATSC, SMPTE, and other standards bodies had finished their work. A benefit of PBS' decision to hold off on investment in its digital HD origination capability was the ability to take advantage of the quick rise of video server technology. In keeping with its most recent renovations, PBS organized a comprehensive move to MPEG-2 4:2:2 servers and automation that will quickly see a role in PBS's evolving DTV origination facility.

Creating a digital foundation

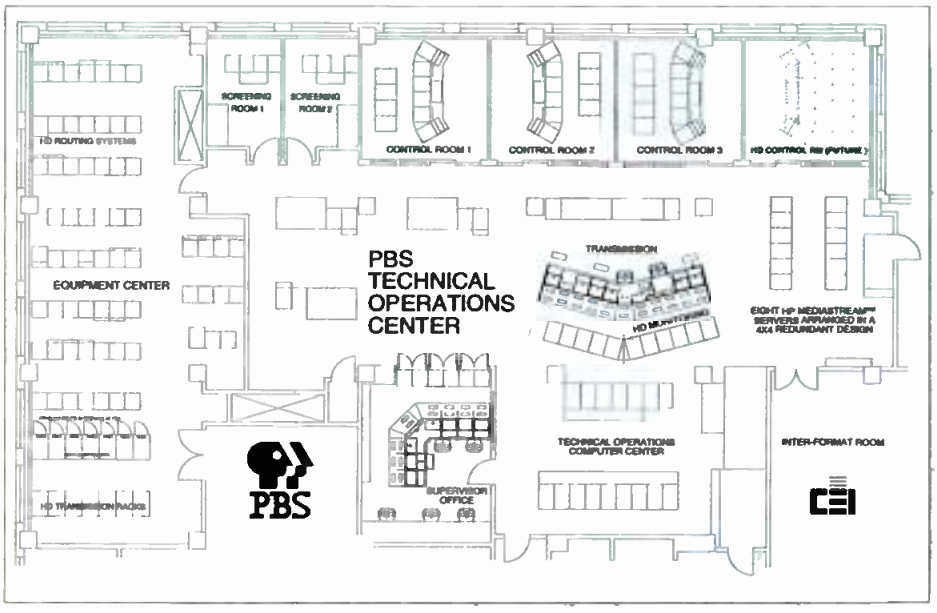
Beginning in 1997, PBS analyzed approaches to a new digital origination infrastructure supporting serial digital ITU-R601, SMPTE 259M component video. Once again the technical team at PBS selected CEI's engineering staff in 1998 to collaborate on an upgrade that included servers, automation and HD origination capability. The following is a description of the design and build process that created PBS' new digital foundation.

The move to an expanded digital platform was accelerated in 1998 by four technical and operational considerations:

- The existing PBS tape delay system needed to be replaced.
- Member stations and distribution clients wanted additional, customized packaged feeds. This meant preparing additional program schedules for a DTV multicast, DBS clients, and new PBS program ideas, including PBS Kids. All argued for additional origination capacity.
- The PBS cart machine capacity was constrained and the broadcast industry's MPEG-based server technology along with automation solutions had matured into a compelling origination alternative.
- The broadcast industry was heralding a new technology direction called DTV. PBS had to be made ready to serve its stations in DTV. PBS early on saw that the opportunity to offer SDTV multicasts would fulfill a need for its member stations, and that meant that its composite distribution facility would need to be upgraded to component.

PBS evaluated a number of server vendors and conducted extensive tests, evaluations, and demonstrations. During the evaluation period server technology evolved from predominately M-JPEG compression systems, at the start of PBS' analysis, into MPEG-2 4:2:2 technology that dominates most server platforms today. PBS' other infrastructure focus was an automation solution to control the new server platform and other devices in the PBS program origination path. PBS selected HP servers and Louth automation due to their ability to integrate closely. It was judged likely that ensuing vendor engineering enhancements into 1999 and beyond would allow PBS to expand and grow this origination platform in the years ahead, to include DTV solutions.

Another factor influencing the choice of HP was that PBS and HP shared the same strategic vision of servers becoming integrated with wide area networks (WAN). An important consideration because PBS' future plans include the use of high-speed TCP/IP networks to transfer programs as files from producing stations into PBS, thereby becoming more effiecient while eliminating the physical transportation of videotape. PBS' networked vision anticipates that future programs will eventually be re-



The new PBS technical operations center focuses on the use of servers for real-time and delayed playout. Sufficient expansion space has been allocated for both additional servers and a new control room.

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PBS

trieved as data files from a PBS archive by its member stations.

PBS' regular on-air operations use HP's current MPEG-2 technology with plans to evolve and incorporate future HP technology in wide area networking, and to support HD origination when it becomes available. HP's 4:2:2 encoder technology helped address PBS' concerns regarding digital compression 'concatenation' artifacts associated with typical distribution client processes that involve program recording, local identification insertions and re-airing. PBS' experience with General Instrument DigiCipher (DC1 & DC2) compression issues had started in 1994 when PBS was one of the first networks to distribute programs digitally over satellite.

Many other systems were designed and built into the PBS digital upgrade to support the move to 601 video, servers, and automation. The key integration *modus operandi* became the fabrication of the racked systems at CEI and the prewiring of the PBS raised floor facility. This prework and planning meant that minimal commotion intruded into existing on-air origination operations during the transition. A third three-channel digital control room was built to deliver Schedule X or the unscrambled program schedule addressed to the C-Band backyard viewers and the DBS clients from DirectTV and PrimeStar.

All programs to air are now originating from the HP MediaStream servers arranged in a 4x4 redundant design. One 'hot spare' is maintained for all schedules at all times. Server operations and Fiber Channel network management are under control of Louth automation systems. The Odetics tape machines now act as 'caching' machines that feed programs into the HP servers several hours in advance of airing. CEI integrated the following systems as part of the overall PBS upgrade:

- The Philips BTS Saturn and Venus systems were expanded. The SDI router was expanded from 192x128 to 256x192 to add additional crosspoints and was expanded during one weekend with assistance from Philips factory personnel.
- Miranda video peripherals were used to transition PBS to component 601 signals. PBS chose Miranda products because of its extensive and innovative product line, and its compact 16-slot frame (in 5RUs). The boards provide format conversion (4fsc/601), encode/decode (601/RGB), synchronization, and mux/demux (audio) solutions.
- NVision's EnVoy switching was selected to provide 1.5Gb/s routing capability for PBS' new HD origination system. Its expandability to 128x128 was a key decision factor along with PBS' experience using NVision AES switching systems.

PBS initiated HD transmission last November in order to give member stations and viewers early access to HDTV programs. The CEI designed and integrated solution uses D-5 machines connected through an NVision 1.5Gb/s HD router. The HD program material is encoded for air at PBS before being stored on a Sencore 19.39Mb/s server. Besides HD material, other 601 programs are upconverted by a Snell & Wilcox HD5100 and then transmitted through the Scientific Atlanta PowerVu Plus system. The Sencore server then records the 19.39Mb/s programs for retransmission, a common scenario given that member station schedules span seven time zones. All system operations are under full automation control.

Future expansion plans

The PBS technical plant's efforts to enhance its program distribution offerings and provide new services never rests. Plans are being developed for new operational capabilities that extend from the recent transition to servers and automation. PBS will increase its servers' storage later in 1999 and take advantage of the individual disk subsystems that have grown from 9GB to 18GB each. PBS plans to upgrade its servers to the recently announced 700 and 1600 products from HP to greatly expand their Fibre Channel data throughput from 4x real-time transfers to 45x and to enhance each server's I/O capabilities.

Currently PBS has 80 hours of online storage associated with the HP servers and retains approximately 12 to 24 months of programming at the Alexandria location. The rest of the PBS content library, with over 100,000 tapes, is located off premises and stored in various formats, including considerable one-inch analog material, and even Quadruplex. The PBS asset library, storage methods and retrieval processes will be addressed in the next 12 months with the planned addition of an integrated data tape archive solution. The vendors under consideration by PBS include StorageTek, Sony, and Ampex. New HP servers will be acquired to provide ingest services for the archiving system and also to enhance PBS' origination capabilities. The size of the archive solution will range from 4TB to 5TB and be integrated with the rest of the PBS facility thorough its Louth automation platform.

The PBS team remains poised to keep PBS at the forefront of television practices with data services and Internet content and distribution efforts underway. ■

Jim Seaman is PBS senior manager of video engineering projects. Steve Lewis is director of marketing for CEI, Newington, VA.

CEI Design Team:

Lawrence S. Brody, President
Jim Conley, Director of Engineering
Jay Brown, Associate Director of Engineering
Herman Reynolds, Senior Managing Engineer
Lachlin Murdoch MacNeil, Senior Design Engineer
Paul Tansill, Mechanical Design Engineer

Equipment list:

Hewlett Packard MediaStream Broadcast Servers (8)
Hewlett Packard Fiber Channel Networking
Louth ADC-100 station automation systems
Philips BTS Saturn, Mars, & Venus audio/video systems
NVision 1.5 Gb HD routing system
NVision AES/EBU routing system
NVision RS-422 routing system
Leitch audio/video conversion & distribution systems
Miranda audio/video conversion systems
Snell & Wilcox, HD2100 conversion system
Sencore ATSC rackmount server
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Transmission & Distribution

Maintaining transmission lines

BY DON MARKLEY

The good weather of summer is with us again and it's time to call in your friendly tower crew to inspect your tower, antenna(s) and transmission line(s). While this subject has been discussed previously in these pages, it is of sufficient importance to be touched on again.

The primary problem seems to be that the transmission lines are mostly way up in the air, away from the prying eyes of the front office suits. Unfortunately, they are also out of the eyes of the technical staff. Problems aren't usually apparent until it is too late for simple correction. Worse, when problems do appear, they often involve total failure and off-the-air time, something that is readily apparent to those same front office suits. But, take heart, with a little work, most problems — except those involving such things as lightning and bullet holes — can be avoided.

Hangers and such

An obvious problem is the manner in which the lines are held in place. Rigid lines should always be held in place by sliding hangers with appropriate springs. A fixed hanger should be located at the top of the line as close to the elbow complex as is practical and at the building entrance. That allows, as we all should know, for compensation between the expansion rate of the tower steel and the aluminum or copper of the transmission line. The hanger springs should be set to the tension recommended by the manufacturer for the type of line. Spring tension normally stays in order, but hanger bolts need to be checked during tower inspections to ensure that the hangers maintain good mechanical integrity. The line itself should be checked at each hanger to verify that no wear is occurring due to hanger misalignment and that the line is free to move through the sliding section.

For flexible lines, a finger grip is still advisable at the top and at recommended intervals along the line. Although some manufacturers no longer feel it necessary to leave the grip in place after the installation, it isn't a bad idea. The clamps that hold the line in place are used to keep the line from flopping about rather than for support. They only need to be adjusted to be snug and should not be so tight that they deform the outer conductor. Without the upper grip to hold the line, it can gradually work its way through the clamps from vibration and expansion until all of the weight is on the top connector. That will shortly be followed by air leakage, which will eventually be followed by smoke and flames.

When problems do appear, they often involve total failure and off-the-air time.

Line failures

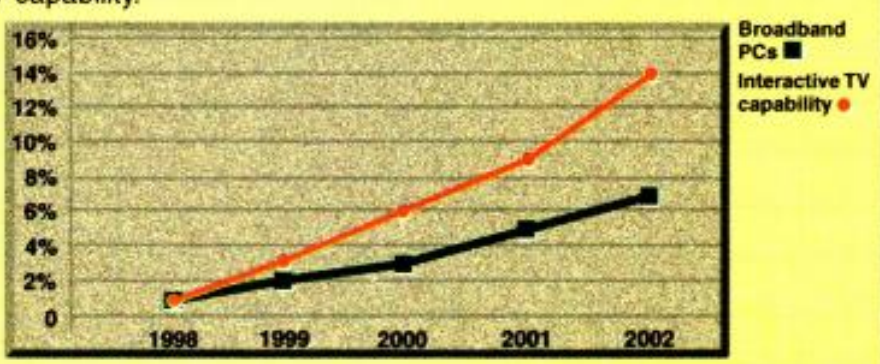
That brings up the problem of what to do when there is a failure at the top of the line. For rigid line, the line should be opened up to well below the point where the failure occurred. Ashes, soot and pieces of copper can be trusted to fall down into the transmission line from any burnout. This residue *must* be cleaned out of the line. This should be done section by section until no further trace can be found. For flexible line, simply replace everything

FRAME GRAB

A look at the consumer side of DTV.

Consumers seek video and broadcast interactivity from PCs andTVs.

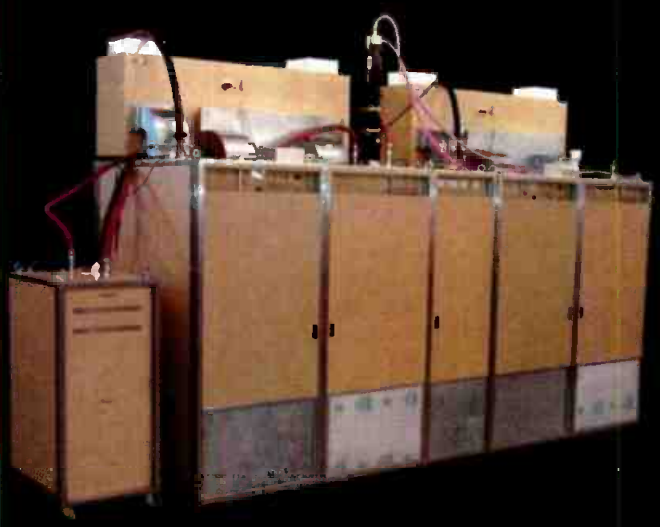
Percentage of households with broadband PCs and interactive TV capability.



NOTE: broadband access includes DLS and cable modems and Interactive TV includes digital and Internet STBs.

SOURCE: Strategy Analytics www.strategyanalytics.com

make an easy shift to DTV transmission.



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below the burnout. The alternative is the enjoyment of another burnout after the trash works its way down into a pile big enough for another arc over. By the way, don't open the line and sniff the air inside when looking for a burnout. Some of the materials used in the manufacture of flexible lines create nasty gases when burned.

Some rigid lines use a wrist-watch-type coil band for the sliding contact at the flanges. That allows the center conductor to move with respect to the outer conductor as happens during normal operation. The center conductor operates at a much higher temperature than the outer, resulting in greater expansion. As the connectors are held by the outer conductor, a sliding contact is necessary unless the center conductor uses expansion bellows. Depending upon the manufacturer, those springs must be replaced periodically. In some cases, the springs last for 15 to 20 years; for others, six to seven years is not unusual. The problem is that the continued heating and cooling of the springs causes them to gradually lose their strength. When springs are new, they are firm and stiff and stand up well. As they age, they become softer and tend to collapse and lie down. It is necessary to replace the springs periodically along with the "O" rings at each flange opened. If in question about the condition of the springs, have your tower crew open up a few sections and physically check them. If you remove one and compare it to a new one, the need for replacement should be fairly evident.

Pressurization

Now for what should be obvious. All non-foam dielectric lines and all waveguides must be pressurized. For coaxial lines of all types, three to five pounds of pressure is adequate. When new lines are installed, the lines must be purged thoroughly of moisture by either pumping dry air through the lines for awhile or by running a couple of bottles of dry nitrogen gas through them. If you are unable to do that while the tower crew is available to open the top of the line, at least pressurize the line and then dump it several times to remove as much moist air as possible.

No matter how tight you may think the line is sealed, moisture will still accumulate inside if it is not pressurized. As the line is heated, the gas or air inside the line will expand only to contract again when the line cools back down. This occurs even if the station is on the air full time. The line temperature varies due to heating from the sun. No line will prevent some moisture from accumulating inside due to this action. Even if it only leaks a few molecules per cooling cycle, moisture will eventually accumulate and gather at the lowest spot, taking the station off the air. The purpose of pressurization is normally to insure that dry air or gas leaks *out* of the line during such cycles and that pressure is maintained during cooling, preventing the introduction of moist outside air.

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A conductive path can form as dust, dirt and moisture accumulate within a transmission line. When that path arcs over, the ultimate result is transmission line failure.

If a dehydrator is used, maintain it. Be sure that lack of service has not caused it to simply be pumping more moist air into the line. If dry nitrogen gas is used, be sure that nothing blocks the lines from the regulator, and that the gas is actually getting to the transmission lines. Leave the gas turned on at all times and check the cylinders regularly to insure that an adequate supply is available.

For waveguide systems, the amount of pressure applied is much lower, typically less than one pound. Applying greater pressure can cause the waveguide to deform slightly, which changes the tuning. A gas dump is usually installed on waveguide systems to let off any pressure buildup caused by solar heating. If the waveguide gets warm from the RF signal, you have a greater problem than you want to deal with – call the manufacturer for help immediately. Waveguide is capable of carrying much more power than used in television systems and should not get warm from the transmitter output.

Transmission line systems normally provide very reliable service over many years when properly designed and installed. The kicker is that they must be maintained and pressurized properly. Their reliability is actually a problem, as transmission line systems tend to be neglected as attention is placed on all that unstable stuff found in the studio making pictures (or whatever it is they do in there). When ignored, line systems will reward you with really spectacular failures accompanied by smoke, arcing and great destruction of parts. While that may be interesting from a gee-whiz point of view, it can be avoided through a little simple maintenance. ■

Don Markley is president of Markley and Associates, Peoria, IL.

Send questions and comments to:
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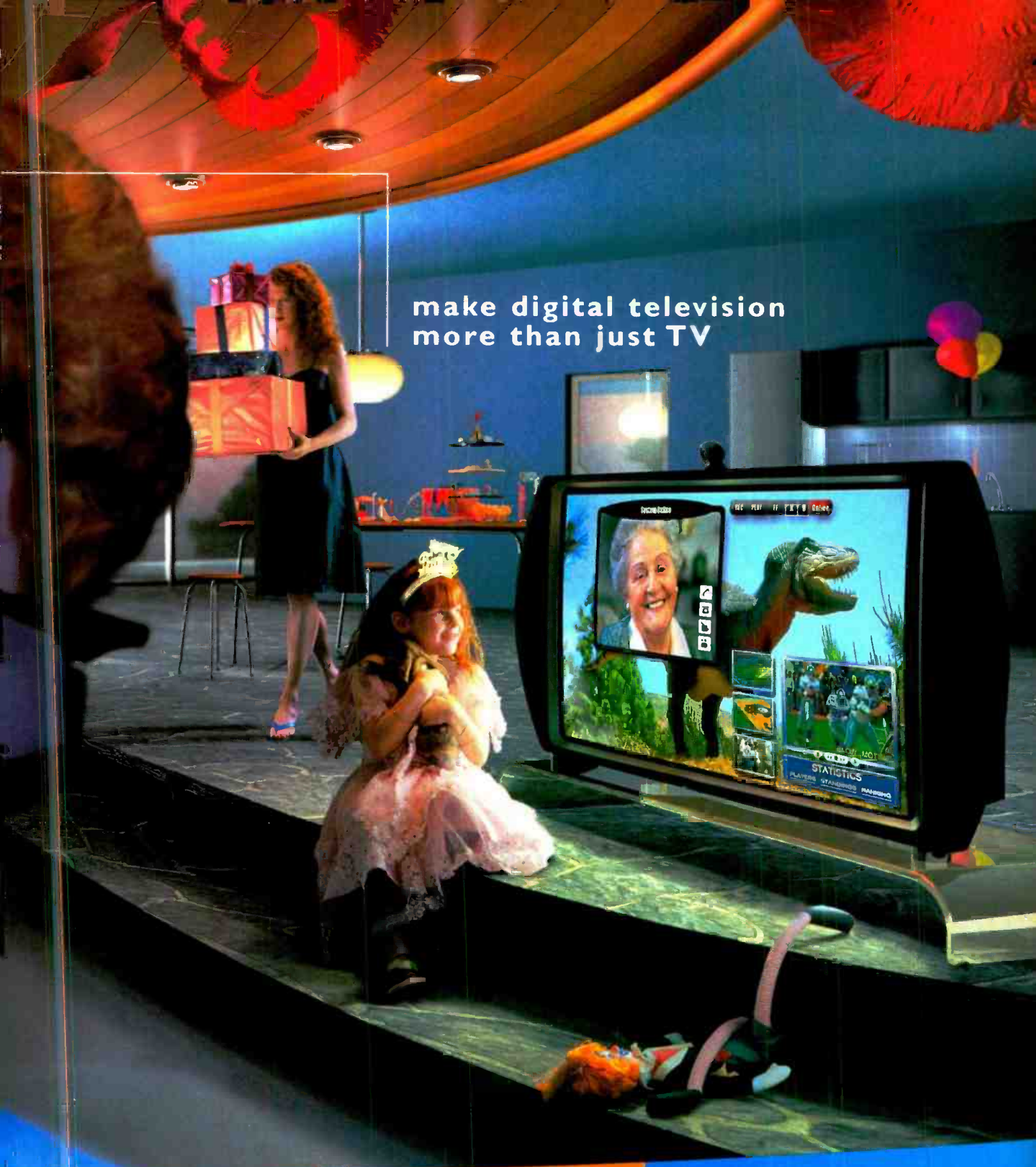

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PHILIPS

Let's make things better.

DAT sync field recordings

BY FLAWN WILLIAMS

Multiple perspectives are a great as set when making a sound portrait of a complex event. But how do you get them when the action is a honey harvest taking place at night, 125 feet up a tree, in the presence of nearly 3 million bees?

The micing and recording demands were already grand in scale, with people in the tree calling back and forth to counterparts on the ground, but an additional hurdle was presented when producers wanted the option of recording a version of this report in Dolby ProLogic surround sound. The situation required recording up to 10 different perspectives, including wireless body mics, cabled omnis hung at various heights between the climbers' location and the ground, and mics on the correspondent and host scientist for play-by-play descriptions.

Because there was no way to guarantee that the mics could be deployed properly on the tree, several methods had been explored to get usable sound from that height, including a parabolic dish mic and helium balloons to lift some of the ultralight DPA 4060 omnis high into the air. But the native climbers, our first choice for mic deployment, turned out to be cooperative about carrying the wireless packs up, and also hauled the tether for a string of omnis reaching from the nests to the ground.

We were far removed from grid power, and the rigors of getting equipment up the mountain precluded bringing a lot of heavy batteries, so a true multitrack solution like a Tascam or Alesis MDM was ruled out. The unpredictability of the event ruled out mixing at the site.

Instead, a small fleet of Sony TCD-D7 and D8 portable DAT recorders, along with Sonosax SX-P2 battery mic preamps, were employed. Two mics could be routed to each DAT recorder, enabling up to ten channels of simultaneous taping. The outputs of the DATs were run to a small custom switcher and headphone amp to monitor the decks singly or in various combinations. Each recorder would run for many hours powered by a D-cell sled.

That "synch-ing" feeling

These small Sony recorders are certainly not built for timecode synchronization, but they have very good inherent time base stability and several subcode data features that make them useful.

Using DATs and ultralight mics (circled) in delicate situations can add another dimension to field acquisition.

Like almost all current DAT decks, they will record absolute time, which is time measured from the top of the tape in hours/minutes/seconds. They also can encode numbered start ID markers called *program numbers* (PNOs) at the push of a button while recording. While the machines could not all be stopped or started at once, nor could the PNOs be synchronized, they could be marked within a window of several seconds.

As they record, the DATs note the time of day in a separate subcode address. The internal clocks on the decks could be set in very close sync, so we had access to a more precise time reference after the shot. (To keep the internal clocks powered through changes of D-cells, it's necessary to also have AA batteries in the internal battery sleds.)

The producer was able to start logging tapes right immediately after the session, so we had an idea of what story elements we had on tape. That was crucial, because the piece was being written on site. Voice tracks were recorded on location, finishing just moments before the correspondent headed for his next assignment.

The sound elements were auditioned in greater detail on individual DAT tapes in the studio, and decisions were made about which events to include in the final construction. Then we synched into surround sound.

We loaded the selections from DAT into a Sonic Solutions digital workstation. The timecode-chasing Sony studio DAT deck connected to the DAW would not display the time-of-day data from the tapes' subcode. Having checked the various DAT tapes in one of the Sony portables beforehand, we had calculated the absolute time equivalents for a given time of day on each tape, and were able to do our loads using absolute time.

This meant our loads were mostly within a second or two of being in sync. Once dragged into the graphic waveform editing environment in the Sonic, it was easy to nudge them into perfect sync.

In this case, "perfect" sync is a misnomer. With mics positioned as much as 150 feet apart, a voice picked up by a nearby mic is also be heard at the distant mics about an eighth of a second later. So part of the creative process of aligning the tracks was to decide where to put the listener in that big sonic panorama. ■

Flawn Williams is a broadcast recording engineer at National Public Radio, Washington, DC.

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television broadcast NAB '99 EDITORS' PICK OF SHOW

Extron Electronics introduces the industry's first six-band video equalizer, an entirely new approach to achieving superior picture quality. The **EQ 100** improves video for videoconferencing, post-production work, duplication and home theater applications by allowing sharpness to be increased without introducing ringing or other video noise. This level of improvement is not possible using single sharpness controls common to display devices. Single controls alter the video level at a very broad range of video frequencies. The EQ 100 can increase sharpness at any of six target frequencies without affecting the video level at undesired frequencies.

The EQ 100 is a full, six-band video graphics equalizer that allows all six bands (from 0 MHz to 6 MHz) to be fine-tuned individually and independently. The enhanced video outputs to any display device that accepts a composite, S-Video, component (Y, R-Y, B-Y) or CCIR 601 digital (4:2:2) input. Bottom line: the EQ 100 gives you complete control over the image sharpness on your screen.

Video equalization is the right way to improve video. The EQ 100 has a list price of $4,995.

The Extron EQ 100 features:

- Six-channel video equalizer for precise detail adjustment of image sharpness
- Intuitive LCD window and onscreen displays to make adjustments and store settings
- Outputs composite, S-Video, component and digital video
- Each input can use an automatically saved picture setting or may be customized to any of twelve additional settings stored in memory
- Compatible with all international video formats: NTSC 3.58, NTSC 4.43, PAL and SECAM
- A three-line adaptive comb filter reduces chroma crawl and provides stable output
- IR and RS-232 capabilities for third party control of all features and functions
- RS-232 loop-out allows the EQ 100 to be connected to Extron's A/V switchers for audio to follow video
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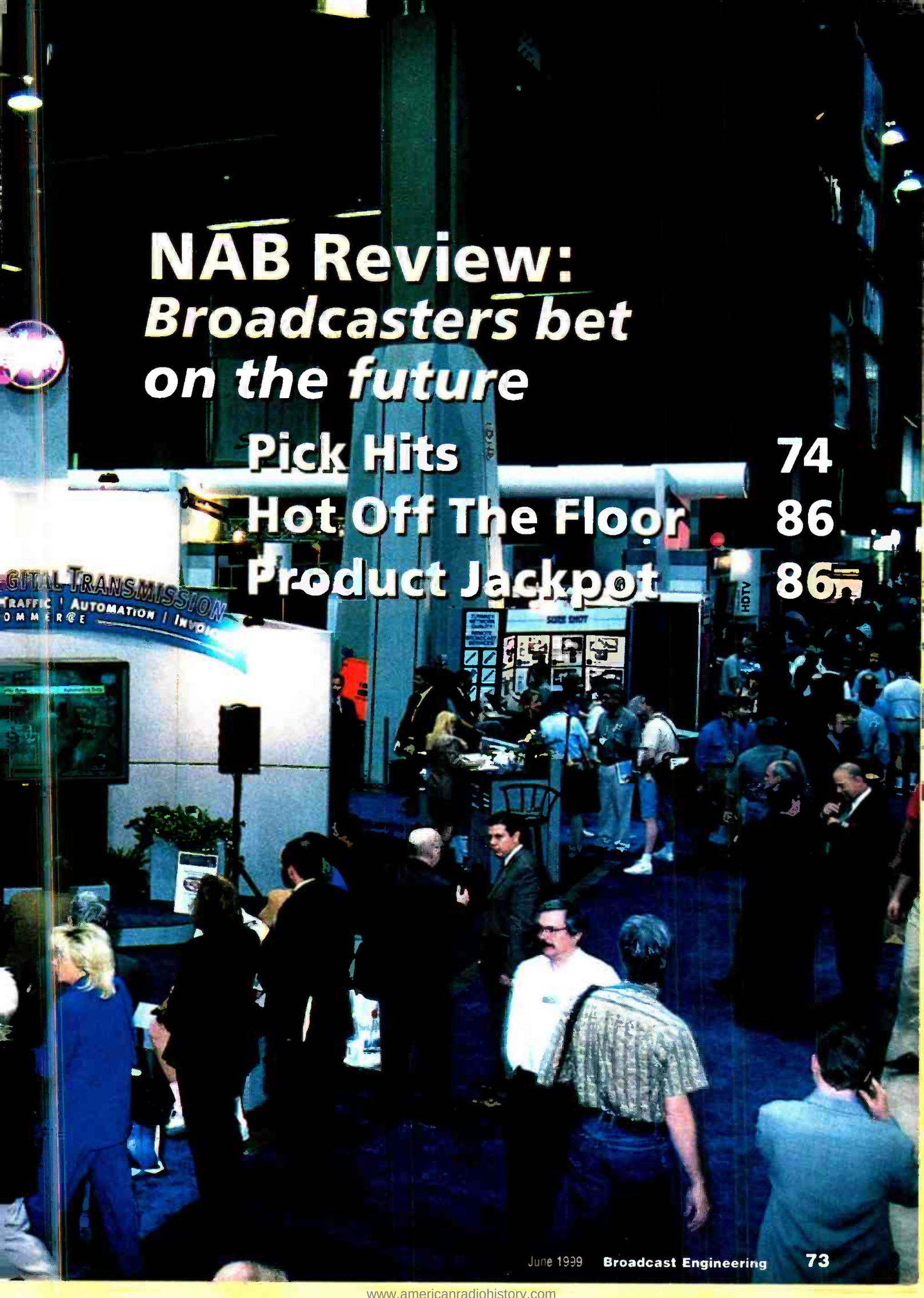
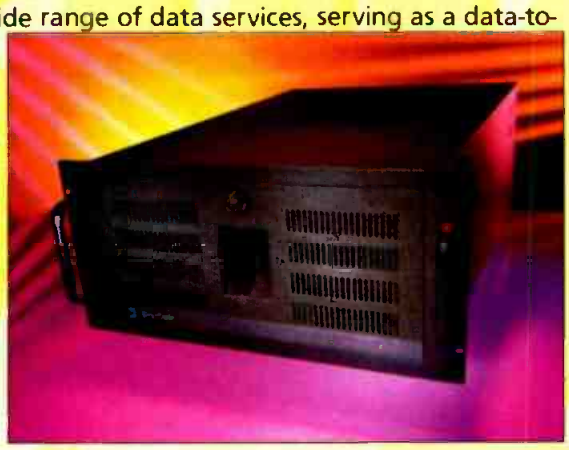
Broadcasters found winning technology on the floor of NAB



NAB Review: *Broadcasters bet on the future*

DIVICOM
DiviCast Data Broadcast System

The DiviCast transmission system enables a wide range of data services, serving as a data-to-MPEG-2 encapsulator and local multiplexer. DiviCast enables services such as broadcast data streaming (push), scheduled file transfer services and overlay network interactive services.



This 5RU, rack-mountable, industrial grade platform has IP networking capabilities and an MPEG-2 I/O board. With 35Mb/s of throughput and more than 60 configurable program IDs (PIDs), DiviCast provides considerable flexibility in provisioning services at varying bit rates and quality of service. Geared toward usage in mission critical applications, DiviCast comes with sophisticated automatic redundancy, hot-swappable fans and power supplies and detailed fault and status monitoring.

408-490-6700; 877-348-4266; fax: 408-490-6999; www.divi.com
Circle (313) on Free Info Card

SONY
MAV-555 Multichannel Videodisk Recorder

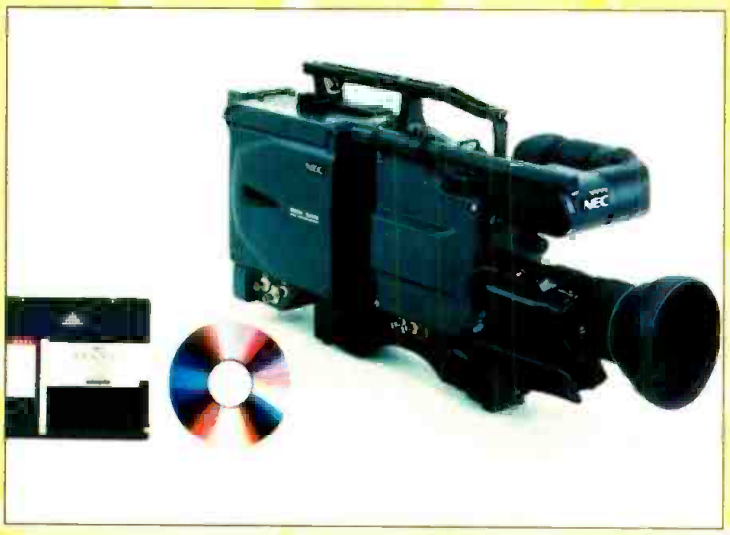
Sony's MAV-555 is a multichannel videodisk recorder that is based on MPEG-2 4:2:2 P@ML compression. It combines VTR-like control panel operation with all of the advantages of a disk recorder, providing both linear and nonlinear editing capability. The disk-based technology is ideal for editing sports and live productions and allows unique functionality to enhance transmission time compression/delay/shift and news production applications. The MAV-555 supports Fibre Channel connectivity as well as SDTI (SMPTE 305) for file transfers. A fast Ethernet (100BaseT) connection allows network connectivity. Numerous internal audio/video effects such as audio crossfades and 2D video rotation as well as key insertion allow operators to quickly enhance productions without requiring additional hardware or personnel.

408-432-1600; 800-635-SONY; www.sony.com/professional
Circle (314) on Free Info Card

AJA VIDEO
HD-10C HD D/A Converter

If you are looking for a quick way to display HD images on a variety of monitors, the HD10C is a miniature, high-quality (10-bit), HD digital-to-analog converter. Analog output is available in SVGA, RGB and YUV formats, making it easy to drive most high-resolution monitors including SVGA, SUN, SGI, and component video. Signal input is 1.485Gb/s (SMPTE 292/296) and it auto-detects 1080i/720p. There are two equalized looping HD SDI outputs as well as outputs for composite sync or H and V drive. Video sync is selectable between bi-level and tri-level, and the unit can be easily configured using external DIP switches. The unit is approximately 6"x3"x1" and consumes only 4W, making it easy to install on or near the backs of analog monitors.

530-274-2048; 800-251-4224; fax: 530-274-9442; www.aja.com
Circle (315) on Free Info Card



NEC
Diskcam

NEC's DiskCam is a dockable videodisk recorder that combines MPEG-2 compression with cost-effective rewriteable disk technology. It is designed for ENG/field acquisition applications in broadcast and post, and can dock with virtually any camera. MPEG-2 4:2:2P@ML compression at 25Mb/s provides high-quality pictures with support for 16:9 images. On the editing side, DiskCam includes a good shot marker and loop recording as well as frame-accurate editing and jog/still/shuttle operation. Each disk is guaranteed for 300,000 20-minute record-erase cycles. DiskCam features two digital audio channels with 16-bit 48kHz sampling as well as an RS-422 edit control port and a disk-based table of contents for metadata.

972-751-7246; 888-383-4DTV; fax: 972-751-7245; www.nec.com/products/ccd/
Circle (316) on Free Info Card

TEKTRONIX
M9601/02HD HDTV DAs

Up until now, HD DAs have been unwieldy, requiring additional connections, removal from the back of the frame, etc. That problem has been solved by these new DAs from Tektronix. The M9601/02HD DAs are comparable to traditional SD DAs; they mount in a conventional manner and provide the functionality engineers are used to. The M9601 DA is an equalizing DA that provides automatic equalization for cables up to 100 meters. The M9602 provides automatic cable equalization (>100 meters) and signal reclocking (jumper selectable) at 1.5Gb/s to eliminate signal jitter. These single-width DAs mount in the standard MAX 9000 series frames and are front removable and hot swappable. Each offers a single input and six outputs, is capable of passing signals from 4Mb/s to 1.5Gb/s and supports 1080i or 720p signals.

800-547-8949; fax: 503-627-7275;
www.tektronix.com/VND
Circle (317) on Free Info Card

DATA CHECK
Series 2600 Multichannel Video Monitoring System

Need a lot of monitoring in a small space? How about six 2.5" LCD color displays in 2RU. What if they tilted +-20 degrees for easy viewing? Well, that's what you get with the 2600 monitoring system from Data Check. These displays offer 234x160 pixels on a 2.5"diagonal screen and run on 12VDC. Front panel controls offer blue field and color kill capabilities along with standard picture adjustments. In addition to the displays, a baseband unit provides input for PAL or NTSC video inputs. Sync is external, internal, or if desired, a Master Sync input can be used. NTSC or PAL tuner modules are also available to allow these displays to be used for off-air monitoring. Combine this unit with the following Pick Hit and you have the capability to monitor six channels of audio and video in only 4RU.

619-578-0101; fax: 619-578-9215
Circle (318) on Free Info Card

WOHLER TECHNOLOGIES INC
ATSC-3 AC-3 Powered Audio Monitor

The ATSC-3 is an audio monitoring and level metering system. It allows operators to easily monitor AC-3 surround sound from an ATSC/MPEG-2 input (other input configurations are available) and is intended primarily for use in machine rooms and edit bays where on-the-spot high-fidelity confidence monitoring is required. This self-powered speaker system has six high-resolution, 53-segment bar graohs for monitoring 5.1 surround sound. Both left/right and front/surround phase/polarity LEDs are provided to quickly alert operators to mixdown cancellation problems. For fault isolation, rotary switches allow routing of any one of pair or inputs to left and right speaker channels for acoustic monitoring. A toggle switch mixes six channels down to two so that all channels can be listened to at once.

650-589-5676; 888-5-WOHLER; Fax 650-589-1355; www.wohler.com
Circle (319) on Free Info Card

RULES:

NAB "Pick Hits" judges operate anonymously and independently. Each year they look for new products that meet the following criteria:

- **Products must be new and not shown at a previous NAB convention.** In some cases, distinguishing a new product from a modified older one is difficult. For Pick Hits purposes, a new product is one with a new model number or designation.

- **Products must have some positive impact on the intended user's everyday work.** Judges should search for equipment that will be used on a regular basis. Products should provide new solutions to common problems.

- **Products must offer substantial improvement over previous technology.** Unique circuit architecture need not be involved, but some new approach or application should appear in the product's design.

- **The prices of the products must be within reach of their intended users.** The judges should seek products appropriate to a wide range of facilities.

- **The products must be available for purchase within calendar 1999.** Equipment must be displayed on the NAB show floor and currently (or imminently) in production. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings off the general show floor do not qualify.

Steven Blumenfeld

Stephen Damas

Mike Grover

Phil Hejtmanek

Ken Hunold

Karl Renwanz

JUDGES:

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Vice President
WBNS-AM/FM/TV
Columbus, OH

Steven Blumenfeld
Director, private networks for the GTE Global Network Infrastructure
Carlsbad, CA

Stephen Damas
Technical Design Supervisor
WGBH
Boston

David Felland
Director of Engineering and Operations
WVMS/WVMT
Director of Engineering
Wisconsin Educational Communications Board
Milwaukee

Mike Grover
Chief Engineer
KJZZ-TV/Larry H. Miller Communications
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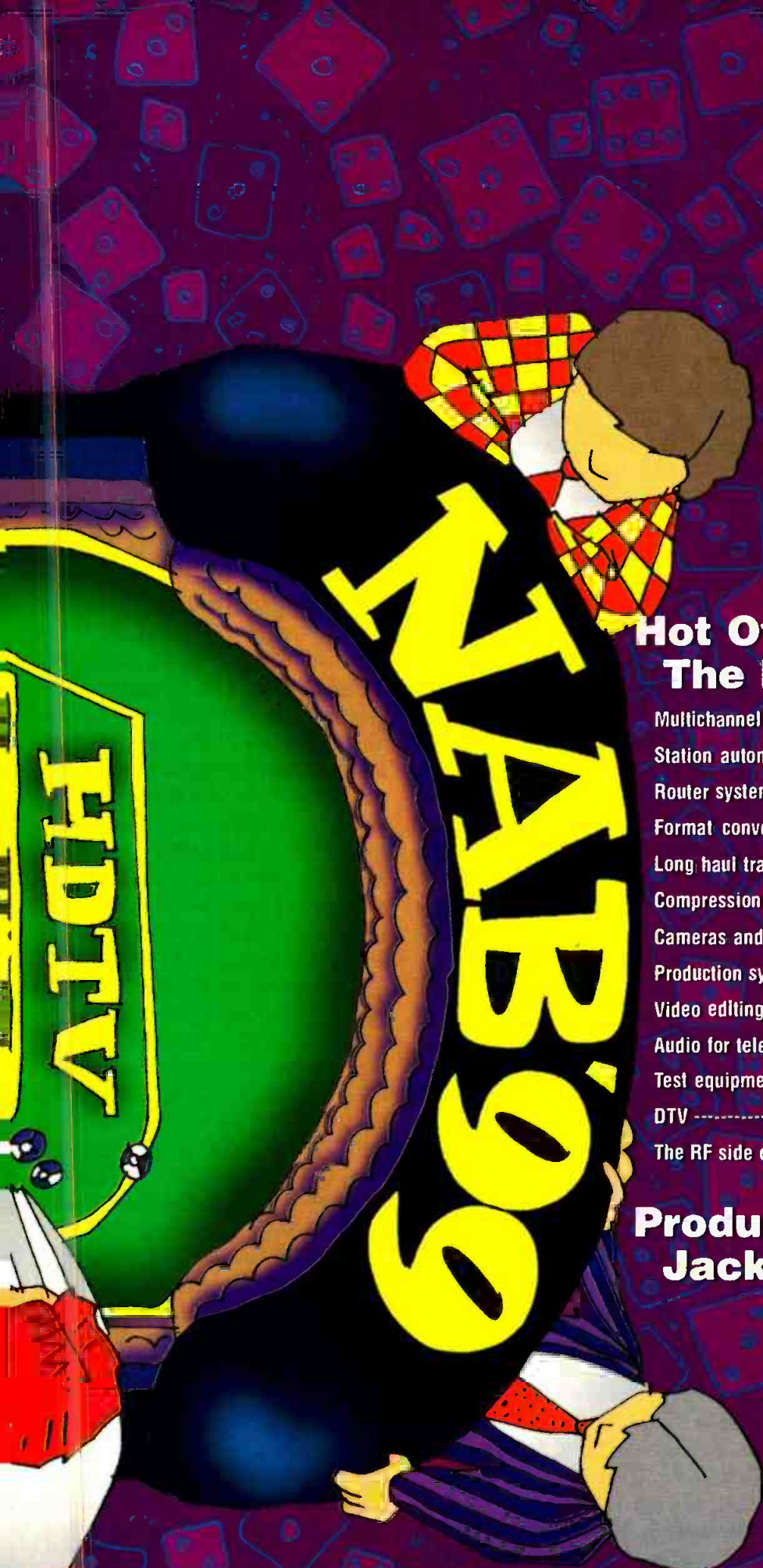
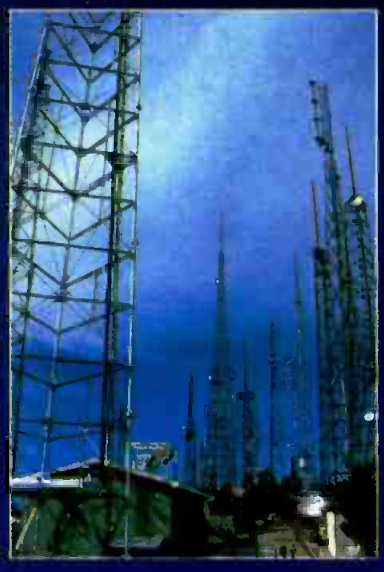
Video Transfer Inc.
Boston



Hot Off The Floor ---------- 86

Product Jackpot ---------- 86



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Fact. In San Francisco, 7 out of 7 chose Dielectric DTV systems.

Fact. In Charlotte, 4 out of 4 chose Dielectric DTV systems.

Fact. In Indianapolis, 4 out of 4 chose Dielectric DTV systems.

Fact. In Des Moines, 2 out of 2 chose Dielectric DTV systems.

The number of broadcasters racing to be on air with DTV is growing exponentially. In city after city across the USA, broadcasters are choosing Dielectric as their engineering partner. Their confidence in us is founded on over a half century of designing more than half the NTSC antenna systems in the United States.

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Circle (42) on Free Info Card

product jackpot

Omnibus introduced Hy-Brow, a desktop browse system. Hy-Brow allows users to view online material and copy and create edits that can be played out on broadcast servers. The system also synchronizes the browse server and broadcast servers.
Circle (384) on Free Info Card

Itelco showed it DTV 50kW IOT transmitter, which uses switch-mode power supplies and offers twice the power of previous Itelco DTV IOT transmitters. It features two tubes and two 90kW switch-mode power supplies.
Circle (362) on Free Info Card

Telecast Fiber offered the Python, which handles eight channels of digital video. The format is independent from 19.4Mb/s to 1.5Gb/s uncompressed HD.
Circle (411) on Free Info Card

AMS Neve spotlighted its Libra Post, a multiformat post-production console. Libra's dedicated panel provides monitoring and matrix processing inserts for up to eight-channel surround.
Circle (330) on Free Info Card

On the compression side, SeaChange supports MPEG-2, but not DV or SX. The company is also planning to introduce MPEG effects such as jog, trim, etc., but those are not available yet. Show highlights included ATSC support in the form of DVB-ASI and ATSC-ASI at rates of 8- to 24Mb/s, as well as 45Mb/s. New lower pricing will be available in the third quarter of this year – 33 hours at 8Mb/s for under $100,000, 36GB drives that have shipped and remote diagnostics.

Leitch showed the ASC server again this year, with the message that, while Fibre Channel is just becoming available for some companies, ASC has been doing it for years. ASC also showed MPEG capabilities on its servers for the first time. The architecture, combined with scalability and I/O redundancy, are among its strongest points. The ASC server now supports DVCPRO, SX, MPEG and uncompressed SDI. They are working on plans for an ATSC server, but do not have anything available immediately. However, planning for this product is well under way.

Omneon Video Networks provided an interesting technology demonstration in the Hilton. The Omneon server will be a new entry into the market, providing excellent performance at much lower costs than we are used to seeing. The system will also be able to mix and match just about any broadcast format you can name, from MPEG-2 to DV to ASI and more. Omneon is building its server around the IEEE 1394 (Firewire) specification for I/O connectivity and Fibre Channel for storage. This approach allows the company to take advantage of bandwidth reservation, low component costs, and mass manufacturing to produce a product that meets the needs of the professional broadcaster, but at a cost that reflects its use of mass-market technology. Omneon is the only server I saw running the new Dolby E audio format, although other servers are capable of doing so.

For more information circle (450) on the Fast Fact Card.

Brad Gilmer is president of Gilmer and Associates, a management and technology consulting firm.

Station automation

By Philip Hejtmanek

In the era of DTV, TV station owners are faced with the need to efficiently manage the operation of not only one NTSC channel but also one or more DTV program streams at minimum cost. Because all U.S. stations must construct digital facilities in the next few years, most owners are considering major facility changes. Many stations already have some form of automation in place for NTSC, but adding one or more program streams will likely require significant additions to most master control facilities. All of these DTV requirements stimulate new interest in workflow management and facility design. Station automation systems are more than critical components of a modern broadcast facility; they are the heart of the operation.

Recently there has been some new terminology applied to this area, based upon the convergence of traditional broadcast technologies and the equipment and techniques of the MIS world. The ability to handle digital video program material as data files has made the hardware, software and system architectures familiar to the data processing world applicable to digital television. Nowhere is this convergence more evident than in the latest station automation products shown at NAB99. A num-

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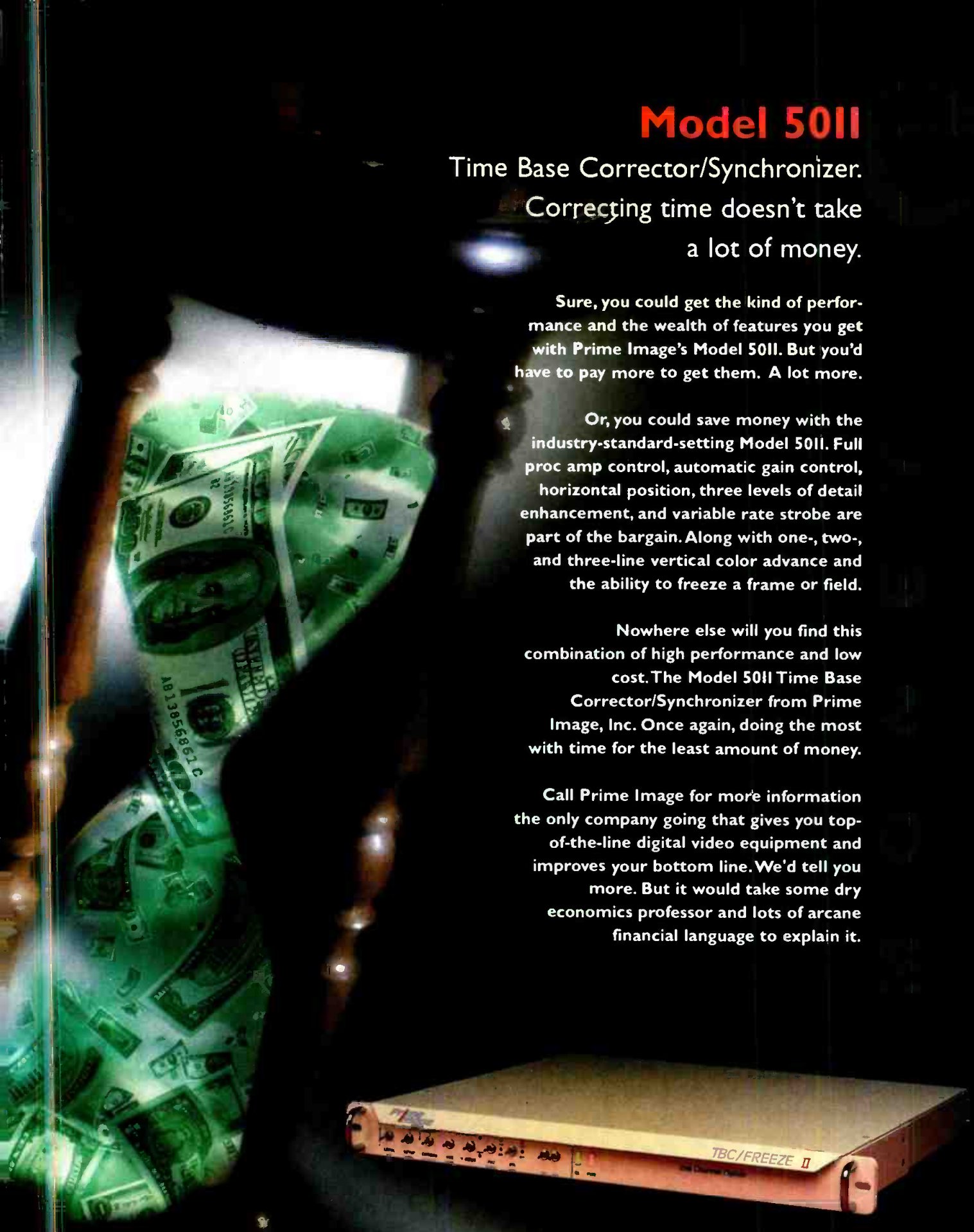

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Circle (43) on Free Info Card

product jackpot

Klotz offered its Vadis DC, which is designed for stations requiring powerful, semicustom digital audio consoles. Any source connected to the unit can be assigned to any fader and source/output configurations can be recalled by pushing a button.
Circle (364) on Free Info Card

Sennheiser showed it MKE2 Gold, a compact and omnidirectional mic with a dual-diaphragm system that eliminates sweat-out problems.
Circle (402) on Free Info Card

Drake Automation featured the A-8000 master control automation system, which uses a new distributed processor architecture to permit in-service system expansion from one to 100-plus channels with full resource sharing and operator access.
Circle (349) on Free Info Card

Drake Automation's Network Control and Monitoring is designed for MPEG distribution systems. It provides transport stream and off-air monitoring and alarm systems, as well as country-wide network monitoring and alarms for digital terrestrial and satellite systems.
Circle (348) on Free Info Card

Tiernan Communications featured its TATM8, an ATM multiplexer/inverse multiplexer supporting up to eight MPEG-2 virtual circuits on a single OC-3/STM1 or DS-3/E-3 physical layer connection. It is compatible with Tiernan's line of encoders and decoders.
Circle (414) on Free Info Card

tion with the Sony HDCAM HD SDTI processor card set. This one device can handle storage and playback needs for both standard and high definition.

For those looking for a simple way to accomplish small-scale spot insertion, Adtec showed its Duet commercial inserter/Soloist 2 digital video player. This 1RU device provides MPEG-2 playback from standard SCSI drives mounted in removable bays and is controllable through Ethernet or RS-232/422.

There is no doubt that storage systems are migrating from tape-based to disk-based. One of the more astounding things heard on the floor was from Seagate. Though the company had a rather low profile, showing in the Fibre Channel Association booth along with several other Fibre Channel vendors, but estimated that there were approximately 45TB worth of Seagate drives in demo units on the combined show floors.

Ciprico featured the FibreSTORE RAID Storage System and the FibreSTORE Fibre Channel Disk Array. The storage system is designed for high-bandwidth single channel and multi-threaded applications and can accommodate between 144GB and 2TB in a single unit. The disk array can handle 72- to 324GB per disk array and up to 2.25TB for one rack of seven disk arrays, and the units feature an upgrade path to RAID.

Sony was showing their MAV-555/565 multichannel disk recorder, which has a form factor and user interface that is very similar to a VTR (for more information, see Pick Hits p. 74). This unit may make it far easier to integrate disk storage into those smaller operations that are based on older technology. Because it is very similar to a VTR, operator training (and anxiety) is likely to be minimal.

Asset management

Current digital TV facility designs call for handling video program material as data files and, in many ways, borrow from the traditional data processing architectures found elsewhere. A new class of automation product has become available, designed to manage the flow of data among the various assets within a network. Typical assets within a networked digital broadcast facility could be video servers, near-line and long-term digital tape archive systems, MPEG encoders and other format conversion boxes. Asset management software is less concerned with the minute-to-minute sequencing of material on a program output channel than with ensuring that the scheduled program material segments are efficiently stored and available when needed by the automation system or other users.

The asset manager is also responsible for moving program segments between long-term archives and the video servers associated with real-time program outputs. Several vendors use a Storage Area Network (SAN) architecture, which uses a highly reliable, high-bandwidth Fibre Channel network to move data between major storage assets. This allows the archive devices to be widely separated from the servers, and permits individual archive subsystems to work together without a server in the middle

One interesting product capable of operating within a SAN-based environment is the Nextore from Thomson Broadcast. Nextore uses an AVI/OpenDML file format and supports the NT file system (NTFS). This two- or four-channel server is based on PC/NT standards and can be used in a lossless compression mode on networks such as ATM, Fibre Channel and Ethernet.

Another feature of several systems shown at NAB is the ability to provide low bandwidth browser copies of program material for utility screening and segment timing, without tying up excessive bandwidth within the system. Typically, two copies of each program are simultaneously ingested into the system, one being the full-bandwidth copy that will be played to air and the other a highly compressed browse copy. A master database keeps track of the status of each copy and ensures that any changes made to one are reflected in the other. The low-bandwidth distribution model has been in use for news applications for several years. In the news automation arena, two players have combined forces, Avid and Tektronix announced AVSTAR, a new company based on a combination of the Avid news system and Tektronix's Newstar system.

On the subject of news automation systems, NewsMaker Systems and Nexus demonstrated the integrated StarDrive/OpenMedia newsroom management and automation system. The system features desktop browsing and editing, digitizing of selected clips and linear viewing of

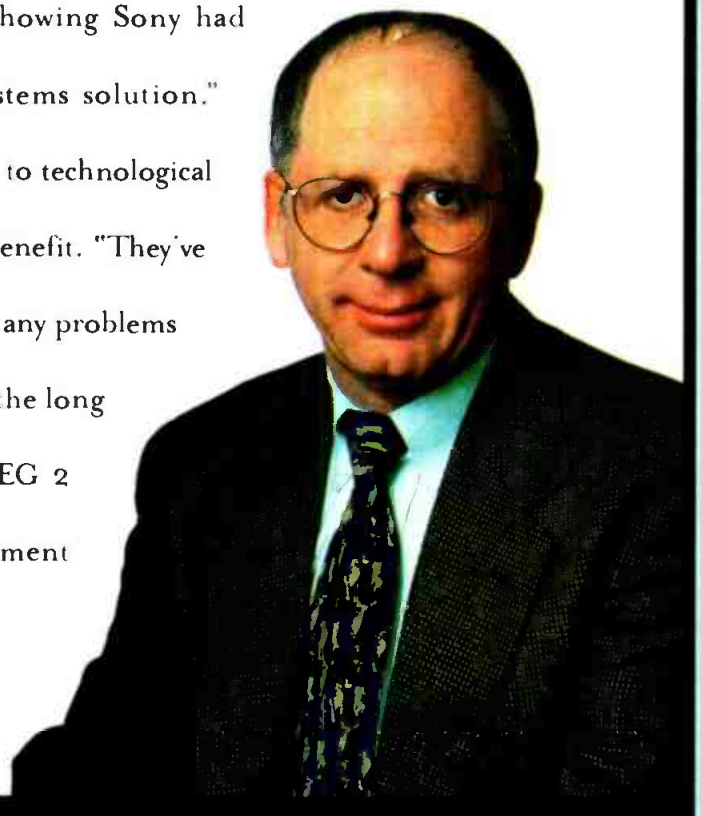
"The world will end up at the MPEG standard. That's why we invested in Sony's Betacam SX technology."

-Ira Goldstone, Vice President Engineering & Technology, Tribune Broadcasting.

From Chicago to Miami to Los Angeles, the Tribune Broadcasting Company is always looking for what's next. So when Ira Goldstone saw Sony's Betacam SX camcorder, he realized he had something that would help him with Tribune's DTV needs. "Backward compatibility is a big issue right now," says Goldstone. "But because, ultimately, the MPEG standard is going to be the long term winner in this arena, we need something that will take us there, too. Sony's Betacam SX technology gives us the best of both worlds. The MPEG compression standard and backward compatibility." Which means Betacam SX equipment gives him everything "from light, rugged camcorders to VTRs that play back archival Betacam SP tapes and interface to existing switchers and routers—showing Sony had thought through a total DTV systems solution." Sony's long history of commitment to technological service and support was an added benefit. "They've always been behind us. They've always taken care of any problems we've had." As Goldstone notes, "Sony's in it for the long haul. And the backward compatibility and MPEG 2 compression standard of the Betacam SX equipment makes it a perfect way to get to the HDTV future."

DNW-9WS Camcorder

DNW-A25
Portable Editing VTR



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timing elements in a news item.

Tape-based mass storage

Contrary to popular belief, tape is NOT dead; its role has merely changed from being the primary means of airing program material to that of an effective long-term archive for clips to be played from a video server. Odetics continues to market and support tape-and-server-based solutions to video storage, as well as a total facility management system featuring browsing capabilities. The venerable Flexicart was also seen in the Sony booth. Sony Recording Media was showing their full line of videotape for the various Betacam lines (SP, SX, Digital Betacam) as well as tape for the HDCAM and DVCAM formats. Maxell introduced its DVCPRO tape, a videotape designed for durability in ENG/EFP applications and editing and playback modes. The tape's shell is coated with a static-reducing resin that prevents contamination from dust and foreign particles.

Most of the activity on the tape front, however, has been as a data archiving component for file-based video storage systems. Ampex and Sony, building upon the technologies originally developed for the ACR 225 and LMS, respectively, have come up with data storage products such as Ampex's DST 412 Library and Sony's Hybrid Data Library with huge, terabyte-level capacities. StorageTek and Exabyte, companies that have branched into the video marketplace from more traditional MIS systems, also showed an assortment of digital archive systems featuring a variety of tape format options and total system data capacities well into the terabyte level.

In all of these digital systems, the data transfer rate and interface are important issues. Transfer rates are often specified with different values for uncompressed or compressed data, so some consideration must be given to the form in which video data will be stored. The transfer rate and the speed of the interface must also be matched to the servers to be connected to the tape archive. Variants of SCSI and Fibre Channel are common interfaces for these systems.

At least one firm, Avalon Consulting Group, found a product niche by developing archive management software that manages video files on digital tape systems and becomes a central data distribution point to the facility's video servers. The station automation system is thereby relieved of the responsibility for keeping track of the data in the tape system, or segmenting long programs across multiple data tapes, while allowing for a mixture of tape and server asset types.

Keeping track of it all

An automation system is only as good as its ability to keep track of the programs being ingested and played out, but there are new issues brought forth by DTV that today's automation programs must consider. A typical DTV plant may have video programs in many forms: uncompressed serial HD, MPEG compressed serial, 270Mb serial NTSC, embedded audio, separate audio, different scanning formats and aspect ratios, etc. The database within the automation system will need to keep track of metadata describing the nature of the smallest video clip, as well as feature-length program. This data will ensure the system can make adjustments to the controlled devices as necessary, to deliver the right clip in the right format to the right output channel.

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product jackpot

Thomson Tubes showcased its TH 755, a water-cooled 44kW NTSC-compatible IOT that is fully interchangeable with most IOTs now in service in the same power class.

Circle (413) on Free Info Card

Hewlett Packard showed its MediaStream 700 and 1600 servers, both offering more than 1000 hours of storage and up to 16 channels in one chassis. The servers provide Fibre Channel networking up to 45x real-time transfers between systems.

Circle (359) on Free Info Card

Among the many new and interesting products shown was the VideoLogger 3.0, a cataloging solution from Virage, which is capable of automatically and simultaneously indexing video, digitizing multiple video formats and outputting that information into any video application or data store.

In the Xytech booth, they showed Enterprise 2.0, a fully integrated facility-management application that supports several databases, including Oracle v7/v8, Sybase Adaptive Server Enterprise V11.5, Adaptive Server Anywhere v5/v6 and Microsoft SQl Server 6.5/7.0.

Sun-Up Digital Systems released a version of its TCS Operating System for broadcast TV and managing digital multichannel direct-to-home (DTH) operations.

Not every station will need all of the automation features available from a given vendor, but engineers should carefully assess their facility's needs and workflow before considering a system vendor. This will help the vendor to ask the right questions and put together a truly appropriate system.

For more information circle (451) on the Fast Fact Card.

Philip Hejtmanek is director of engineering for Newsweb Broadcasting, Chicago, IL.

By Ryan Steward

NAB99 allowed router manufacturers to showcase new products and improved features. Many showed new and larger matrixes, smaller-sized frames and improved software packages. Most manufacturers now include the very necessary migration path to HD in their product lines.

Some of the older analog Philips routers can now be upgraded to handle HD applications by changing ZIF connectors and swapping out I/O cards. Philips also designed a unique feature for AES/EBU audio. Internal to the router, select any two audio inputs to create a pair for output, two of the same source for mono feed or one English and one Spanish for SAP applications. A new soft transition added to the audio side drops the output to zero then switches to the new source, eliminating any pops at audio source switches. New Windows 95 software speeds and simplifies router setup programming. Vulcan software lets you layout the router using click and drag functions similar to Visio. It automatically locks out used ports and only allows correct device options. On the control side, Jupiter software adds many options, among them the ability to schedule, via time code, a frame-accurate deterministic switch of preset sources. With the VM-4000, an unlimited number of outputs can be set up and switched at a preset time code mark. This is useful for dub facilities and show recordings. Other items of interest in the Philips booth included the GS-400 Venus Gigabit routing switcher and two new control panels, the Series 2000 LCD control panel and the CP3824 programmable control panel.

Tektronix's new 7500 series is a narrow bandwidth (50Mb/s and below) serial digital router. It is small and very efficient. A loaded 256x256 only uses 120W and is 12RU in height, a smart choice for mobile production trucks. The frame can be powered from 120VAC or 48VDC, making it ideal for cable applications. Tektronix also added a new 48-button-per-source control panel to its line. Router software is GUI-based for control and panel programming. If you're holding out for a Tek HD router, stand by for an announcement at IBC.

NVision's Envoy line has a migration path to HD capabilities. This is possible by swapping out I/O cards in increments of eight. The HD cards can operate in the same frame as the SD, side by side. The Envoy line can be expanded up to 256x128 for SD or HD. These frames will be available by the time you read this. If digital audio routing is more what you need, NVision offers

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synchronous audio up to 2048x2048. NVision also announced a price reduction due to improved production techniques — 40% in some cases. The company also previewed Windows NT-based control software that utilizes the SQL database and makes layout, programming and control of the frames a snap.

Leitch showed its Integrator line of routers. The 128x64 frames are now available in the 128x128 size. At that size, the router requires only 12RU. The AES/EBU audio frames will support many formats. The need for external conversions is eliminated with synchronous or asynchronous, balanced or unbalanced coax, and now DAC and ADC daughter cards mounted to the I/O cards in the frame. Nearly 40 control panels are available, one to satisfy almost any situation. One new controller is software programmable to be an X-Y, single or multibus controller. This unit uses a scroll knob for system navigation. Leitch has now added a new 12x2 HD router to its line. The new frames provide a migration path for the future by swapping out the existing I/O cards. Leitch developed an impressive software package for the setup and programming of its frames and controllers. One of my favorite features is the ability to print labels for the panels from inside the program. Just set up the panel and print the corresponding labels as needed.

Sony had several routers on display, among them the DVS-128 compact routing switcher for analog audio and video applications. For SD/HD routing, the Sony HDS-X3000 digital routers offers several frame sizes to meet a variety of needs. The HDS-X3400 is a 16x16 switcher that fits in a single rack unit, while the HDS-X3700 is a 128x128 switcher that fits in 8RU.

At Pesa, attendees found lots of unique router options. One I found interesting was the e-route, a remote router control software that uses a 1RU server (located at the site to be controlled) on a LAN, WAN or Internet to switch remote offsite routers. Simply go to the address, run a Java applette and you can control the switcher. The system can support up to 10 online users. The Tiger 144x144 dual AES/EBU digital audio router is now available. Jumper settings allow users to select either 110Ω or 75Ω input impedance. A 250MHz bandwidth version of the Jaguar analog router is now available for high-quality RGB applications. The Ocelot line sports a new 16x16 switcher with a bandwidth of 400MHz, also for high-quality RGB applications. A new 1.5Gb/s Ocelot HD router, in 16x8 or 16x16 versions, is now available and only requires 1RU of space. The Cougar line added a tally matrix capable of single and multiple color control. Frame sizes are 32x16 and 32x32. The LNS line now has a SD and HD 8x2 switcher in a 1RU frame, with expansion to 16x8. The 3500 Plus control software is available with upgrades that provide control of larger frames and more levels.

Datatek displayed its D-2800 and D-2600 series of analog and routing switchers. The D-2800, designed for medium and large operations, can accommodate 256x256 digital video in 44RU. The D-2600 series can provide 32x32 routing of digital video, audio or RS-422 data. Both systems use the same control system that feature tie-line management, virtual tally system and matrix mapping.

Sigma Electronics spotlighted its Series SLX digital source selection switchers, which are available in 16x1, 16x2, 32x1 and 32x2 models for a variety of formats. Telect showcased an S-video module, an 8c8 Y/C switcher module that docks in Telect's configurable VersaFrame signal management system.

In the Vela booth, they were showing their IDS compact router. It is an 8x8 that is expandable to 16x16 and supports analog and digital audio and video. As an IDS component, the router can be controlled by a networked external PC with and intelligent GUI. One interesting feature is the control panel/front panel contains switches to control the router, but disconnects just like a blank panel. When combined with a small rackmount back panel, the front panel can be used as a remote control.

I also found two very interesting smaller routing companies. Network from Norway offers some very small routers in both analog and digital formats for video and audio. If you need routing in a small place for truck or offline areas, these definitely deserve a look. A 64x frame will be shown at IBC.

The other company is Quartz from the UK. They also offer a great line of analog and digital routers for audio and video. Of special interest are the control

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Evertz introduced its DTV Frame 7700FR, a 3RU frame system capable of holding HD, SDI and analog equipment in the same frame. The frame system's features include front loading, hot-swappable redundant power supplies and hot-swappable module configuration.
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Chyron offered Meridian, a comprehensive solution for smaller TV stations integrating station automation and video servers into their operations for the first time. It includes a hardware automation controller for single-channel control.
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Pro-Bel featured the ICON modular family, a versatile and cost-effective platform that addresses the signal processing and distribution needs of TV facilities. Status-monitoring facilities are provided by an optional control processor.
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Chyron showed the TX 310, a new master control switcher with HD video capability. It features a compact 12-input control panel and processes serial digital video and AES, analog or embedded audio inputs for single or multichannel operations.
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options. They offer control interfaces to and from most major manufacturers. If you have a Philips router and like Quartz controllers, not a problem. If you need a small router for offline, controllable from your production switcher, not a problem. They also have a very nice LCD button controller that offers keycap text that changes with each page and has three different colored button illumination. If you are looking for a way to monitor all of those routing channels, Data Check was showing some compact LCD monitors. The 2000 and 2600 series fit six displays in 2RU (for more information, see Pick Hits p.74).

Synonymous with routing switcher installation is cable and connectors. Trompeter highlighted its MPW20 monitor plug, which can be plugged into a patch panel and used to monitor signals without degrading or interupting the normal through signal path. Also shown were their UPL2000 series BNC connectors.

Gepco showcased its VSD2001TS, a 75W coaxial cable capable of transmitting 1.485 HD or composite digital video. The cable allows runs in excess of 340 feet for 1.485Mb/s uncompressed HD or 1200 feet for 270Mb/s transmissions. Gepco also introduced the 5526FC, a digital audio multipair cable designed for transmission of 110W AES/EBU digital audio. The cable features 26-gauge conductors and integrates a nonconductive polyethylene rod that is twisted together with the insulated conductors.

Commscope showed their Quantum video cables, which deliver broad bandwidth with low attenuation characteristics. Quantum cables are also sweep tested for HD bandwidths out to 2.4GHz.

For those times when you need a signal amplifier in an out of the way place, VAC (Video Accessory Corp.) showed its LDVB/VDA-G line driver. It has one adjustable gain output from one input and offers flat frequency response from DC to 50MHz.

For more information, circle (452) on the Fast Fact card.

Ryan Steward is chief engineer at WFTX-TV, Cape Coral, Fl..

By Paul McGoldrick

The smorgasbord of standards the ATSC created for DTV has also created format conversion equipment opportunities for vendors and decision and operational headaches for users. When we had to think up ways of converting encoded video standards across international boundaries we thought of the practitioners as being involved in magic; they had to invent video material that didn't exist by creating what it probably would have been if it had existed. We now have to be seriously involved in converting materials that we might even have created ourselves.

It is possible, if not probable, that some material might have to pass through up to five stages of format conversion before the home viewer receives it. Although these concerns were raised and demonstrated by the manufacturers of the converters, not one of those vendors was willing to justify that position during discussions at NAB. The typical comment was that care could ensure that would not happen. More concern was shown about the problems associated with film insertion quality and like issues.

Film is being held up as the digital storage medium of the millennium. From it, in 35mm or larger dimensions, can be produced any of the SD or HD formats of the ATSC Table 1. In that scenario, the telecine becomes the ultimate format converter and the most critical piece of equipment to be specified. With the present proposals being

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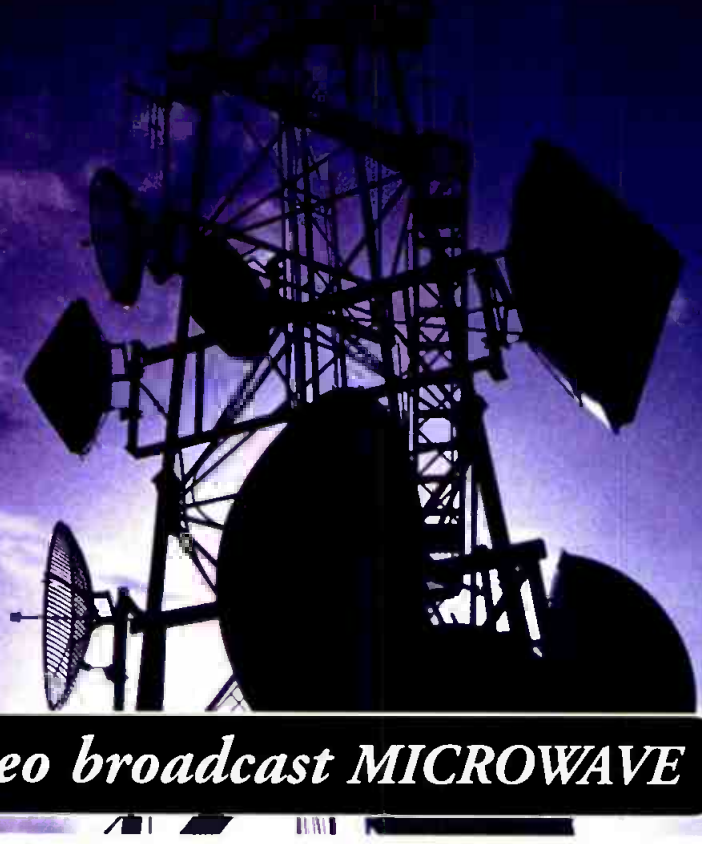

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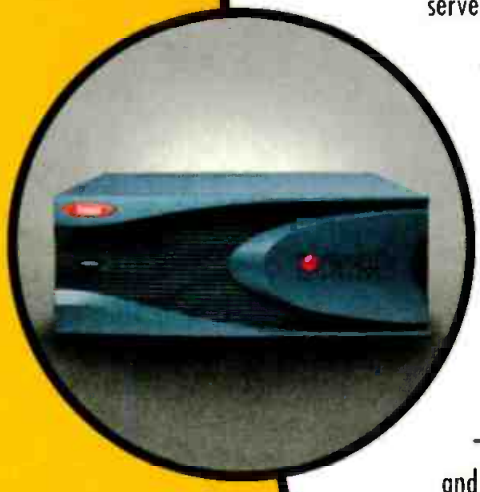

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formally and informally discussed there would be a 1920x1080 24p, 16:9 mastering standard where the frames are segmented into even lines and odd lines from the progressive scan. Considering that 35mm film has been the guide to quality in determining what the HD picture should look like, this makes a lot of sense. The sequential frame proposal might even have some effect on the motion judder of 24fps productions. A number of filmmakers are also expressing interest in electronic production at 24Hz with equipment likely to be available in short order.

The rest of the programs

Like it or not, we have to accept that the vast majority of programming is not new material and is probably not 35mm film waiting to be converted perfectly, film blemishes excepted. Programs from the '60s, '70s and '80s will continue to be shown through the first decade of the millenium — what might be called the '00s. That material has to be format converted up, down and even (sort of) sideways when we think about changing the aspect ratios either with overscan or letter-boxing. There was just about every kind of conversion you could think of at NAB and the products from companies such as Leitch, Miranda, Panasonic, Snell & Wilcox, Sony, YEM and Astro Systems showed rock-solid format conversion with quality that looked in all cases as you would expect.

Material used at a trade show, however, is not a clear indicator of real program operation. And talking with a couple of vendors about that situation brought some vehement remarks about others. Clearly some companies believe that other equipment is optimized for show display between certain formats and that you will probably get what you pay for. Many customers are in the decision phases without having the infrastructure available to test equipment in their own facilities. Of course, this is how any NTSC or component equipment would be validated today. Because of this, it is going to be difficult to make purchase decisions without referring to colleagues at other stations or production facilities who have already made the jump. That could limit the choice for the decisions and eliminate some of the smaller companies who have entered the market.

We are also being blindsided, perhaps, by the top 30 market euphoria. There are only so many stations and production/post production houses that are in the A++ market for equipment. Those operations can afford the DTV transition and will be stronger for it — when consumers start to buy receivers. Below that core of high-technology savvy and financing there are a lot of other users who will need the equipment without the price tags. The price range of $40,000 to $100,000 doesn't work for those users. There was no sign of any manufacturer addressing that much larger, less-demanding market, a market that is opening now and will likely have about a four-year window.

Other formats

Going from computer to video, of all formats, is still a technologically-demanding task, an arena revolutionized by Magni Systems in the mid-80s. There are manufacturers of products offering converters from $50 for a card to $35,000. Take your pick for what you need but take care about that ever-lingering descriptor "broadcast-quality."

Among these conversion products, Extron showcased the VSC series, a line of high-resolution computer-to-video scan converters which offer user-selectable levels of horizontal and vertical filtering, autoscanning technology and optional digital output modules. Extron also introduced the EQ 100, a video noise reduction system that provides independent adjustments to video signals at six distinct frequencies and functions as a six-band videographic EQ.

More significantly for DTV are two areas that have induced some imagination from vendors. A studio operation — and there are other applications — has a considerable amount invested in monitors. Those monitors are in the vision control areas, the production areas and the audio areas. How many of them actually need to be HD displays after you convert your operations? In most cases maybe two: one for immediate quality detection, one for backup. Realizing that, the guys at Tektronix designed a unique distribution amplifier. It takes in a serial digital 274M (1080i) or 296M (720p) and reclocks it to give four distribution outputs (already useful) and, in addition, it scales down the signal to produce two NTSC/

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Opticomm showed its FMX-5000, a universal multimedia digital transport system for distribution of signal over wide networks, including PAL, NTSC and SECAM for multichannel QAM and VSB signals.

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RT SET introduced the Laurus 3D Virtual Studio System Verison 3, the latest version of the virtual studio system with HD capabilities. The new version of Laurus features a Pica Virtual Billboard, 3D weather presentation capabilities and template support.

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RT SET also unveiled the second version of the Ibis 2D Virtual Studio System. The newest version offers improved user interface for importing images, greater control over video elements, control over video mapping and remote control features.

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Storage Concepts launched FibreScan, an intelligent remote administration utility for Storage Concepts' real-time, RAID protected FibreRAID storage systems.

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PAL outputs and two 259M (4:2:2) serial component outputs. The picture quality of these converted signals (in the M9603HD HDTV Monitoring DA) is not at program level, but it is good enough for signal identification and confirmation purposes in a production environment. Two companion DAs, the HD9601 and HD9602, are also available (for more information, see Pick Hits p.74).

A second, you-really-will-need-it converter comes from YEM. The SSC-292M is a sync standards converter which can take either NTSC color black (sync and burst) and convert it to HD trilevel sync, or it can operate in the opposite direction. The whole matter of the use of trilevel syncs is going to cause some confusion in many production environments. This unit could well be a lifesaver when you need what amounts to an SPG for one format or another. The HD formats supported are 1035i, 1080i and 720p with the outputs at HD in both analog trilevel and TTL. YEM was also showing a HD format converter, the HFC-292M, that cross-converts SMPTE-recognized HD formats within the unit. The format converter also responds to telecine signals and features motion adaptable line scanning interpolation (for more information, see Pick Hits p.74).

For another form of format conversion, check out Sierra Design Labs Ultra SCSI option for its HD1.5Plus multiple-resolution DTV/HDTV disk recorder. It provides for the real-time upload and download of HDTV pictures to or from a workstation in either Y, Pb, Pr or GBR colorspace, with all HD resolutions and rates supported on standard multisync VGA monitors. A compact and simple way to display HD signals on a monitor was shown in the AJA Video booth. The HD-10C is a small convertor box that can be mounted on or near the back of the desired monitor (for more information, see Pick Hits p.74).

In addition, there were a variety of other interesting conversion products at NAB. Here is a quick rundown of some you might have missed. In the Pixel Instruments booth they were showing their VS-5200 universal synchronizer along with the AD-3000 audio delay/lip sync corrector which can work as a companion product to the VS-5200. Other audio/video delay systems for correcting lip-sync problems were also on display including the Lip Stick from Calrec (for more information, see Pick Hits p.74) and the ADL 200 from Axon, which can track the frame synchronizer function of Axon's AS-240 and FLS-200 frame syncs.

Off the show floor, TeraNex offered the VCA-6110PXC all-format converter, a combination up/downconverter and side-converter that accepts and delivers SMPTE 259M SD I/O and 292M HD I/O.

Ensemble Designs introduced the Avenue, a digital video and audio converter designed for signal conversion, distribution and timing. The Avenue allows users to interface signals to a router, synchronize incoming satellite feeds and convert digital and analog signals. The unit comes in a 3RU frame and accepts a mix of 10 video and audio modules.

Finally, Video International showed its DTC4600MV, a bidirectional DTV standards converter offering frame-based recursive filtering and 10-bit digital encoder/decoder.

Whatever your format conversion problem, it has been thought of.

For more information, circle (453) on the Fast Fact Card.

Paul McGoldrick is an industry consultant based on the West Coast.

By Steven Blumenfeld

As our industry attended the last NAB of the millenium, it is only fitting that I should be writing about moving photons around the world. With

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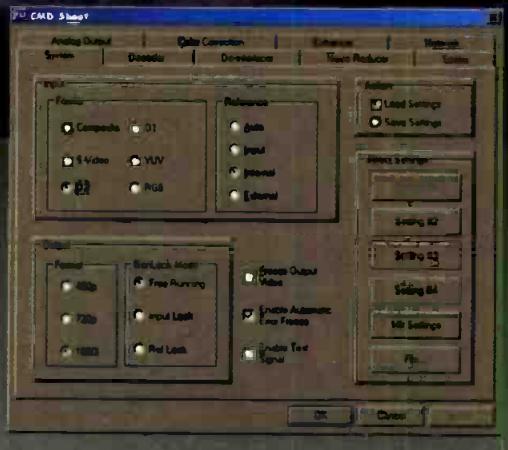

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105,000 attendees and more than 25,000 international attendees, the broadcast medium is surely global. It was evident that broadband fiber transport of production audio and video is taking on a larger role in our world. Science fiction writers have long written about the day when all information will be transported by way of light, and the enormous information requirements of our society will be moved as easily as we make a phone call today. There is little doubt that day is getting closer, if it is not here already.

First, let me make a distinction between *inter*facility and *intra*facility connectivity. Interfacility transport focuses mainly on tying various routers and switchers together to create a larger local switching fabric. Intrafacility connectivity is expanding this concept to a global scale. To achieve this expanded connectivity, hardware vendors and service providers are developing convergence tools for seamless media-to-network connectivity. Most of the work has been centered on optical technology, which is evolving very rapidly.

The excitement in the intrafacility transport saw numerous companies introducing new products. Products were shown from Lucent Digital Video, ECI, VPG, Tektronix, Broadband Networks Corp. and transport services from AT&T, I-Connect, Vyvx, Pac Bell, WAM!NET and GTE's VideoConnect.

Fiber has become a cost-effective method of connecting facilities located across the street or across the globe. This highly secure physical transport media cannot easily be compromised. In terms of bandwidth, arguably, the most flexible and the most efficient is a network based on packet switching. Asynchronous Transfer Mode (ATM) service is an integral element of many Network broadband data service offerings and provides an economical alternative to frame relay and SONET transport for large amounts of bandwidth.

ATM is a high-bandwidth, fast-packet switching technology based on fixed-length cells of 53 bytes that combines the statistical multiplexing efficiencies of packet-switching with the low delay characteristics of circuit switching technologies.

ATM service establishes connections that may be permanent virtual channel (PVC), permanent virtual path (PVP) or switched virtual channel (SVC). ATM service is a connection-oriented, cell-based data service capable today of physical access interconnection speeds up to OC-48 (2.5Gb/s). PVCs are bidirectional circuits. Typically, these parameters are configured to be the same information rates in both directions. However, additional bandwidth may be allocated in one direction and not the other. In other words, ATM service enables provisioning PVCs with different information rates between locations.

ATM offers a single network design for all data needs (audio, video and data) and supports the concept of quality of service (QoS). ATM service supports the following QoS categories for virtual connections:

Constant Bit Rate (CBR): For when it absolutely must be there! An ATM service category that supports a constant or guaranteed rate to transport services, such as video distribution, that require rigorous timing control and performance parameters. The traffic parameters associated with CBR service are Peak Cell Rate (PCR), Cell Transfer Delay (CTD) and Cell Delay Variation (CDV) and are tightly constrained.

Real-time Variable Bit Rate (rt-VBR): The real-time VBR service category is intended for time-sensitive services (i.e., those requiring tightly constrained delay and delay variation), such as interactive multimedia. Sources are, however, expected to transmit at a rate that varies with time. Traffic parameters are PCR and Sustainable Cell Rate (SCR).

Nonreal-time Variable Bit Rate (nrt-VBR): The nonreal-time VBR service category is intended for applications that have bursty traffic characteristics and do not have tight constraints on delay and delay variation. Like rt-VBR, nrt-VBR traffic parameters are PCR and SCR. For those cells that are transferred, the application expects a low CLR.

Unspecified Bit Rate (UBR): When it needs to be there, but who cares when. An ATM service category that does not specify traffic-related service guarantees. Specifically, UBR does not include the notion of a per-connection negotiated bandwidth. No numerical commitments are made with respect to the CLR experienced by a UBR connection, nor to the CTD experienced by cells on the connection.

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product jackpot

Philips' HD Media Pool, the HD edition of its popular Media Pool, now consists of newly manufactured components, including the VR-8000HD (video input/output module), a AS-8000 storage array, either 9GB or 18GB disk drives and a control application.
Circle (387) on Free Info Card

DPS unveiled the Perception RT3DXi, a nonlinear editing system that includes RT3DX hardware and Video Action 6.3 editing software. When combined with a Perception DDR, the system offers up to two hours of storage, a Pentium II 450 processor and 128MB RAM.
Circle (345) on Free Info Card

Fujinon featured its A22X7.8BDEVM and A22X7.8EVM lenses. They feature long focal length (172mm) and a wide angle of view (58.58 degrees). The A22X7.8BDEVM is designed for use with 16.9/4:3 switchable cameras, and the A22X7.8EVM for use in 4:3 units.
Circle (358) on Free Info Card

Sachtler exhibited the DV 8, a tripod system for lightweight digital cameras. The system includes the DV 8 fluid head, S14 tripod, Sp14 spreader and the 14/Pan cover. The tripod system handles cameras and accessories weighing from 11 to 22 pounds.
Circle (399) on Free Info Card

switched ring architecture into a system that assures maximum network availability. SONET acts as the key infrastructure transport while ATM serves as the integrated switching platform.

ATM services currently support multiple network access speeds based on application requirements. ATM access is usually offered at DS3 (45Mb/s), OC-3 (155Mb/s), OC-12 (622Mb/s) and OC-48 (2.5Gb/s) speeds. This range of ATM access options enables a facility to use a single transport service to meet the needs of remote locations as well as centralized host locations.

Networking equipment

At NAB, Lucent Digital Video (LDV) introduced the VideoStar LinkRunner TXA, which transports compressed video over the public network. The TXA is a bidirectional device, and supports remote control of equipment through a single network connection. Also the LinkRunner TXA is an MPEG-2 ATM transport stream adapter, which allows network providers to map up to four MPEG-2 Transport Streams across an ATM or a point-to-point network. This flexible product supports a variety of network interfaces and is factory-configured for interfaces including DVB/ASI and OC-3. The product supports LAN emulation and serial data communication for control of remote equipment.

Video Products Group had its recently announced VPG8000 serial digital video/audio transport system. It can transport SMPTE 259M/ITU-R 601 270Mb/s serial digital video over 80km of fiber. The 8000 can embed four AES/EBU digital audio channels, two RS422 machine control channels, longitudinal timecode, as well as talkback into the 270Mb/s data stream. The VPG8000 also incorporates multiple laser wavelengths in the 1310nm and 1550nm range for distances up to 100km.

The VPG8000 either takes pre-embedded D1 video/audio or embeds analog or digital audio and other ancillary data into the video stream. It features error detection and handling support and audio options with digital audio synchronization capability. The VPG8000 supports both intercom/coordination channels and longitudinal timecode in addition to ancillary data timecode.

The HD48 from Tektronix sends uncompressed HD video over standards-based networks and opens up new opportunities in the transport of high-definition video. The HD48 video edge device is a SONET/ATM, HD serial digital video transport system. Its PCI-bus card design allows additional video interface cards to be coupled to the same network interface card (NIC) to facilitate transport of accompanying data on independent ATM channels. This flexible design will allow standard definition video or additional audio to be carried on the same OC-48 link. Benefits of this new video edge device include video clock regeneration, full 10-bit video transport to carry embedded audio and control data, auto sensing of video types and rates, and monitoring of SONET and ATM errors during transport.

The BBNC-2300N ATM Multiplexer from Broadband Networks Corp. enables the implementation of BBNC's video networking solution over standard ATM networks. The BBNC-2300N provides the ability to multiplex up to nine MPEG-2 video streams onto a single ATM network interface compatible with the ATM Forum UNI 3.1 specification. The unit is housed in a 3RU VME chassis. It consists of a motherboard, supporting three channels, and two daughter boards supporting an additional three channels each. In addition, the BBNC-2300N contains a CPU board for control and Simple Network Management Protocol (SNMP), a hard disk and a power supply.

Optional multiplexing redundancy may be implemented through the addition of a second set of multiplexer boards inserted in the same VME chassis. The resulting two ATM interface outputs (one from each set of multiplexer boards) are fed into a standard ATM switch. The BBNC-2300N Multiplexer supports a variety of ATM physical interfaces, including DS3, OC3c, E3, and STM1.

The BBNC-2300N implements a management information base to control ATM, MPEG-2, and redundancy specific parameters. It can be managed by an off-the-shelf SNMP management station.

ECI Telecom's Hi-TV is a broadband ATM multiservice multiplexer (MPEG and ATM) and network terminal. It supports ATM UNI SVC and PVC (wide area ATM network interfaces including E-3, DS-3 OC-3, STM-1, OC-12 and STM-4) with a range of video qualities

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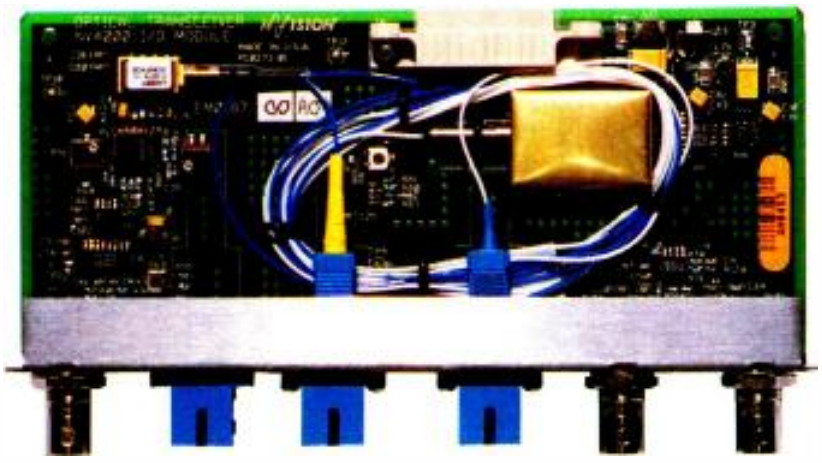
Transporting Digital Video via Fiber Optic Links

Fiber Optic technology has been successfully employed by Telcos for many years. However, its use as a transport layer for digital video has been limited and viewed as an expensive technology for all but long haul applications. Most of the electrical-to-optical (E/O) and optical-to-electrical (O/E) converters offered for digital video applications are modified versions of telco designs. Although these products provide adequate performance, they often carry a high cost and do not always handle all possible signal patterns found in the video format.

With the advent of digital television and the requirement to convert many analog broadcast facilities, fiber optic transports will probably become a standard requirement to ensure that SDI (270/360 Mbit) signals can be easily distributed at distances in excess of 250 meters. An additional motivation to employ fiber will come from any installation that will generate, distribute or redistribute programming in HD-SDI (1.5Gbit); in this case, receivable signal distance via coax will be limited to 150 meters at best and nominally 100 merers.

NVISION... has a reputation for delivering high quality products at reasonable prices, and carrying this image over to the fiber designs was paramount.

NVISION, a manufacturer of routing and distribution equipment for digital video and audio signals, based in Grass Valley, CA, has taken a new approach to the design of products for fiber optic conversion. Inspired by their design of new routing products for HD-SDI and SDI signals, NVISION now offers a comprehensive range of



NVISION's 4000 Series HD4270 module

O/Es, E/Os and transceivers for SDI and HD-SDI signals. These modules have been designed from the ground up.

Before the NVISION design engineers set pen to paper (or mouse to pad), the company conducted extensive research to understand user requirements and their difficulties with available equipment. This research uncovered several problems that required attention:

1. The purchase costs for the E/Os and O/Es were too high.
2. Available fiber E/Os were often very sensitive and required that SDI signals performed well within the SMPTE specifications for signal level and jitter.
3. Most fiber products would not handle pathological signal content (long strings of 0s or 1s)
4. Adoption of fiber often presented technical problems for system engineers unfamiliar with the nuances of fiber termination and management.

NVISION started by designing fiber converters for HD-SDI, as this was technically the most difficult task. They utilized their 4000 Series equipment frames as the host for the new modules. This allows purchasers to include fiber optics with standard DAs, A to Ds, embedders etc. The company has a reputation for delivering high quality products at reasonable prices and carrying this image over to the fiber designs was paramount.

As a result of their efforts, they now offer six fiber optic products: An SDI transceiver (SD4170), an SDI O/E (SD4171), an SDI E/O (SD4172), an HD-SDI transceiver (HD4270), an HD-SDI O/E (HD4271) and an HD-SDI E/O (HD4272). All of these products meet the following criteria:

1. The new products are inexpensive.
2. They will perform well with any input signal that meets SMPTE specifications.
3. They will receive all signals without bit error, including pathological content.
4. NVISION offers a technical support line to help system engineers with fiber installation (530) 265 1059.

Other additions to the 4000 product line include 4 to 16 channel audio embedder/disembedders. When used in combination with fiber optics, these products allow a video channel and up to 16 phase aligned AES channels to be transmitted over tremendous distances for an affordable price.

Also, these products provide the only current method to transport accurately phased groups of six audio channels at base band. This provides a reasonable way to manage surround sound mixes (5.1 channels) prior ro compression for delivery to the home.

NVISION can be contacted at 1 800 719 1900 or by fax at 530 265 1021. You can visit their website at www.NVISION1.com.

Calculating transmission distances

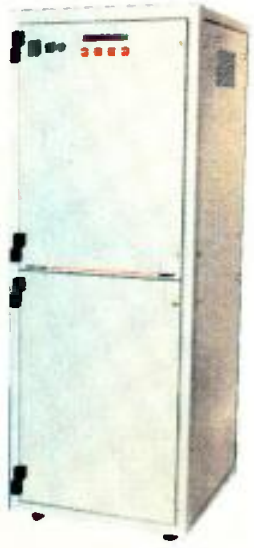
When determining the transmission distance for a given signal and fiber optic transmitter/receiver combination, the following rule of thumb is applied. Please note that the numbers given are pessimistic and are offered as a guide only.

1. Calculate the maximum loss budget (allowable loss between transmitter and receiver), *i.e.* Tx power = -7.5dBm – minimum receiver level = -20dBm
   Maximum loss = 12.5dBm
2. Calculate the losses of the path, including length and connectors.
   Use 0.3dBm loss per km for SDI or HD-SDI.
   Add .5dBm loss for each connector in the path (including bulkheads).
   Total loss = length in km x 0.3 + # connectors x 0.5dBm
   i.e. 10 km x 0.3 = 3dBm + 4 connectors x 0.5dBm = 2dBm.
   Total loss = 5dBm
3. Subtract path losses from the loss budget. (It's that easy!)

product jackpot

Leitch showed its VR400 MPEG-2 server, an MPEG-2 broadcast server that incorporates high-bandwidth centralized Fibre Channel storage, integrated software RAID technology and multiformat codec technology. The server is available immediately for order.

Circle (366) on Free Info Card



Andrew also introduced the XT4500 Dryline Automatic Dehydrator. Designed for large operations, the unit provides enough dry air for pressurizing up to 2500 feet cubed. The XT4500 is activated by a programmable controller and remote pressure sensing.

Circle (332) on Free Info Card

Sundance Digital unveiled FastBreak Automation, a system that incorporates TCP/IP-based SIDON architecture. FastBreak Automation offers an easy-to-use interface, and playlist events may be triggered manually, by time or by completion of a preceding event.

Circle (409) on Free Info Card

and compression modes.

Hi-TV has a modular system architecture that consists of a common platform, plug-in network boards and plug-in service boards. The Hi-TV board architecture comprises a lower main processing board which supports a range of upper interface modules; each can be easily plugged-in any of the platform's 12 universal slots. Hi-TV provides SNMP-based control and management and T1/E1 circuit emulation for voice and data user services. Call setup is performed using a Windows-like GUI.

Service providers

Network services from Vyvx, AT&T, Pacific Bell, WAM!NET and GTE's VideoConnect are being rolled out to take advantage of these new hardware interfaces.

Williams Vyvx Services is an international provider of integrated fiber-optic, satellite and teleport video transmission services. It provides complete transmission paths for worldwide distribution of broadcast news, sports, advertising and special events. Its transponder inventory is linked to Williams Communications' 20,000-mile U.S. fiber network through its four U.S. earth stations.

AT&T announced it will offer local ATM service to 41 cities this year, providing end-to-end ATM service on a single platform. AT&T's Local ATM Service addresses the high-speed data requirements of businesses regardless of their location. It provides any distance connectivity for businesses with either local-only or a combination of local and national data network requirements. The new service extends the features, functionality and reliability of AT&T's national ATM network to business' local networks. AT&T Local ATM Service is being deployed over AT&T's existing switching platform. This platform features web-based tools that let customers order, track and monitor their data network; self-healing network capabilities via SONET Rings; and FASTAR and FASTAR II automatic rerouting for connections between points of presence in the same area.

A new entity called I-Connect is commencing operations for a multicontinent ATM addressed service. This new entertainment industry service is usage-based, high capacity, and scalable. I-Connect is the result of a three-year development process with a group of strategic partners, including major carriers and equipment manufacturers.

Pacific Bell offers two services: Advanced Video Services (AVS) and Advanced Video Services-Component Digital (AVS-CD). AVS offers broadcast quality composite NTSC service that has the ability to deliver video and audio to multiple locations over its fiber-optic network. AVS-CD is a fully digital, compressed video service offering component D1-quality service.

WAM!NET Inc. announced the availability of its compressed video delivery service. This new MPEG-2 video delivery solution is designed to integrate existing workflow and digital capabilities. WAM!NET's managed private network and services can be tailored to support customers' existing systems and production partner arrangements.

This service supports an MPEG-2 Video Recorder and Desktop Review Station to control recording and playback in a digital environment. WAM!NET claims that incorporating the service into an existing workflow is simple with the MPEG-2 recorder connected to a video device or router. Review quality 4:2:0 MPEG-2 video is recorded at bitrates of 1.5 to 12Mb/s and transported using the WAM!NET service, which travels over a high-speed, secure, private network. The desktop review station provides play back review-quality MPEG-2 video on an NTSC/PAL monitor with the ability to select, play, store and delete any clip with ease.

There were several interesting items on the small end of the scale, including Clipmail Pro, from Telestream. Clipmail Pro, a low-cost method for electronic shipment of video packages over existing Internet and telecommunications networks. In the Sands, Innovacom showcased the TransPeg 500 ATM system which can be used to broadcast and record MPEG-2 (4:2:0 & 4:2:2) in point-to-multipoint configurations. Opticomm was showing its Series FMX-5000 fiber optic, uncompressed, serial digital transport system for HD, DVB and STI systems. These units featuring single mode (1310, 1550nm) 20dB laser-based 40km operation over one fiber.

For more information, circle (454) on the Fast Fact Card.

Steven Blumenfeld is director, private networks for the GTE Global Network Infrastructure, Carlsbad, CA.

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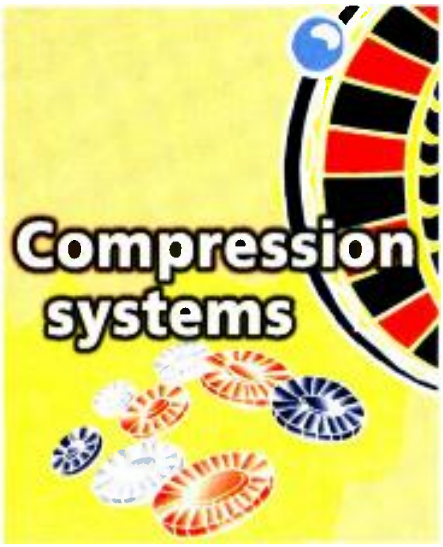

By Mark Boeddeker

The term video *compression* stands for many things these days, and every one of them was represented at this year's NAB. Basically, video compression describes the various ways in which redundant information is removed from a digital video stream so humans do not notice the missing information. The various tape-based digital acquisition formats on the market (S-Digital, DV, DVC, Digital Betacam and SX) all use a compression scheme of some kind, as do many satellite uplinks, cable on demand or DSS systems. To determine acceptable visual quality levels, human perceptual models have always been used, but as DTV and HD implementation proceeds, the quality model should become what is better and best. Ultimately, different eyes will see different things; therefore beauty, and perceived digital artifacts, will continue to be in the eye of the beholder.

MPEG-1 was designed to transfer data from a T1 line or single-speed CD-ROM. It has been widely implemented in all manner of applications from games and CD-ROM to video on demand and point of purchase, but broadcast applications are limited. At video CD data rates, it aspired to VHS quality in a digital format. At slightly higher data rates (in the 3-4Mb/s range), MPEG-1 looks comparable to MPEG-2 at the same data rate, especially with line-doubling or other buffered techniques used at the set-top. MPEG-2 was designed to support a much wider range of resolutions and data rates. M-JPEG compression has produced good-looking imagery for years and has been the compression scheme of choice for NLEs. Many applications will continue to use M-JPEG, even though MPEG has become the standard for broadcast and DTV delivery. One reason is that MPEG-2 delivers a broadcast-quality image at approximately 50 percent of the data requirements of M-JPEG. Editing MPEG is still problematic, but products on the market already claim to address most problems.

As analog tape formats begin to fade away in the broadcast world, MPEG servers will take their place. Feeding those servers will take a myriad of devices, leaving quite a bit of flexibility as to exactly how it's done. Integrating new technology is challenging, but systems and hardware exist to answer any operation's needs.

Sony's SX product line is a system of native MPEG-2 acquisition, editing and transmission products that no one really knew what to do with a few years ago. Things have changed. Staying MPEG throughout the acquisition to the transmission process has decided advantages. Several of the networks have implemented SX products in their operations, and it is one of the less painful routes to DTV and HD. The media-server technology that supports SX is an example of how multiple workstations can access the same digital image base.

Integrating multiple workstations and formats on one shared database requires file compatibility on a major level. Often one would choose to keep certain investments working (even if they do generate obsolete file structures). Products from companies like CentraVision/MountainGate create file systems that allow products running on different operating systems to access the same database in their native file formats.

In terms of shared files, a major development in the field of compression in general is C-Cube's release of its DVxpress architecture, which will allow a new generation of editing products to work in a mixed DV/MPEG environment. This is a great new idea, and all the products involved certainly are going to get more efficient in the year to come.

Although encoders exist for most computer operating systems, Mac-based encoders led the way in creating files for the early MPEG-1 applications. Mac-based Minerva and Sonic Solutions products proved very compatible with DVD applications early on, but PC-based encoders from companies like

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product jackpot

Leitch showcased its Opus, a multichannel, high- and standard-definition unit that offers eight auxiliary video outputs and sixteen primary and eight key inputs. It allows users to control the aux outputs from a range of router control panels.
Circle (367) on Free Info Card

Video Products Group showcased its VPG8000, a serial digital video transmission system. The VPG8000 provides ITU-R 601/SMPTE 259M-compliant 4:2:2 video and audio transport over fiber or coaxial links.
Circle (418) on Free Info Card

Acrodyne introduced its Renaissance series of high-power UHF analog and digital transmitters. The Series includes analog transmitters from 1kW through 240kW and digital transmitters from 1kW through 100kW, and are scalable to meet future needs.
Circle (326) on Free Info Card

Andrew introduced its new line of ValuStar receive-only earth station antennas. The antennas are operational with C-band, INSAT C-band, and Ku-band reception requirements, and polarization is adjustable through 360 degrees by rotating the feed horn.
Circle (333) on Free Info Card

Innovation TK was showing the Y Front, a telecine machine that can handle up to 3000 feet of film. The Y Front offers greatly reduced noise, improved colorimetry that elimnates contamination between colors and makes film scratches almost invisible.
Circle (360) on Free Info Card

Optibase and Digital Vision are keeping pace. The simplicity of Linux would lead one to expect more products running on that OS soon.

One thing to keep in mind is that the MPEG specification is a multifaceted gem that includes simple, main, and high *Profile* specs at low, main and high *Levels*, as well as several others. For example, MP@ML refers to a main profile (4:2:0 quality) at main level (601 resolution) MPEG environment. MP@HL refers to 4:2:0 quality at high level or HD resolution.

What this means is that there are many types of MPEG, and you should be sure you know what kind you need. Higher-priced encoding products in the $100,000+ range are capable of customizing the encode parameters of an MPEG stream, both audio and video. This makes them capable of delivering virtually any type or quality of MPEG file. If you need everything, you'll have to pay for everything.

If you intend to do DVD exclusively, some of these minimum configuration encoders may be sufficient, but more flexibility in the encoder will let you use it for other things.

There are several capable encoders in the "less than $100K" category that are often seen bundled with DVD systems. Other encoders are only available as part of a DVD authoring product. If you intend to do DVD exclusively, some of these minimum configuration encoders may be sufficient, but more flexibility in the encoder will let you use it for other things. Depending on your video source, pre-processing may be required so you are not wasting bits trying to compress noise. Several pre-processors were on display this year including the Prefix from Snell & Wilcox (for more information, see Pick Hits, p.74). Digital Vision introduced the BitPack-HD, an HD offline or premastering system for video servers and DVD. The BitPack-HD creates HD files for 1080i/720p formats using the same BitPack control environment as standard definition.

For encoding, a common feature is the ability to do CBR (constant bit rate) as well as VBR (variable bit rate) encodes. VBR encoders use an average bit rate process that allocates more data to be used in visually complex or problem areas. Some products utilize multiple-pass encoding which produces a finer analysis of the video in terms of things like scene change detection, theoretically resulting in a better encode. Options such as video preprocessing, inverse telecine detection and the ability to re-encode problematic video segments are other features that can add to the final price of any encoder.

MPEG audio is standard with most encoders, but, for many applications, PCM or Dolby AC-3 is required. This is an option you pay for most of the time. Integrated audio encoders work just fine and sometimes have an advantage in terms of maintaining sync with the associated video, but an audio-only facility has some options when it comes to stand-alone PCM and AC-3 encoders.

A new generation of low-cost encoder/decoder products is also entering the marketplace. For dedicated applications, some of these products may be completely adequate. One thing to consider is that the single board, single chip type of encoder is not going to have the flexibility to generate the more esoteric MPEG streams, and artifacts are more apparent in a low data rate CBR type of encode. Decoders need to be able to handle high data rates without choking or locking up.

MPEG decoders (play devices) usually require a multiplexed or muxed file for playback. This is a file in which the discrete video files (.mpeg, .mpv) and audio files (.ac3 or .mpa) are merged into one file. Encoders can do this on the fly in real time, or they can deliver elemental (discrete) audio and video files which are muxed later. Some end use applications require special recipe

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product jackpot

Pixel Power introduced its Clarity HD graphics system, supporting the high-end feature set of its Collage system, unlimited real-time layers, and full-featured video painting and keying. Clarity supports 720p and 1080i and offers support for 1080-60p.

Circle (390) on Free Info Card

Louth introduced its DTV Manager, an automation product that controls digital transmission equipment as a stand-alone system, with an existing Louth system or with another automation system. The system enables management of facility without retooling.

Circle (371) on Free Info Card

Accom offered its Abekas 6000 multiflex DTV server for news editing and playout. The 6000 features 2, 4, 6 or 8 digital video I/O channels, more than 100 channels local online storage and 3000 hours of network online storage and RAID-3 parity protection.

Circle (324) on Free Info Card

multiplexing, which is usually done after the initial encode with a dedicated multiplexing tool, such as the applications available from Pixel Tools, Heuris or Manzanita Systems.

Elemental MPEG-2 audio and video files are multiplexed into transport or program streams. Transport streams are designed for use in potentially high error environments, such as transmission. They include timing elements that make them more error tolerant and so, less dependent on specific playback parameters. Program streams function in a variety of software environments and are less error tolerant. Many applications and/or hardware devices will only play one stream type or the other. For those wanting to analyze these streams, Interra showed its MProbe MPEG bitstream analysis and compliance software which can be very helpful when looking for problems in these areas.

Software encoder/transcoders can give new life to many systems by adding the ability to create MPEG-2- and DVD-compliant streams from a variety of sources, including DV and .avi files. Some products include a hardware assist in this conversion, but even with dual processors, software crunches are time consuming.

For now, we will continue to get what we pay for. Many end use applications don't require the highest quality MPEG files available, and can be supported by one of the less expensive encode/decode solutions. On the other hand, the expensive encoders are more flexible in terms of file type and encode parameters, and can produce higher-quality, higher-bandwidth encoding than is possible with the cheaper gear.

Among the many products shown at this year's show, several were interesting including OpenTV's OpenAuthor 2.0 software authoring tool that is designed to help create interactive television programming. The software includes 32 built-in gadgets and allows them to import and preview content. STB Systems (now 3dfx) showed its Quartet series of multiport MPEG decoder cards, capable of decoding four MPEG streams using a single PCI slot. For those looking to make multiple CDs on a small scale, Telex showed the CDP 2001, a desktop CD duplicator that supports all standard writing modes and is easily expandable to support DVD-R and CD-R.

Finally, ISLIP Media demonstrated the MediaSite AutoLogger and MediaSite BuilderNT. The Autologger allows users to encode, catalog and index video of browsing and retrieval over intranet or Internet. MediaSite BuilderNT analyzes and indexes video based upon Autologger metadata and the video information itself.

For more information, circle (455) on the Fast Fact Card.

Marc Boeddeker is director/DVD author with Producer's Post, Burbank, CA.

By Bob Bergfeld

It has been said that the only constants in life are death and taxes. Unfortunately, whoever made that statement overlooked one other significant constant — change. Along with change comes the need to make decisions. Change and related decisions have always been synonymous with the broadcast industry. Broadcast technology evolution requires continuous change, more so as we enter the FCC-mandated era of digital and HD broadcasting. The decisions will be many, and among them are decisions concerning acquisition. Last year's NAB provided several image acquisition/conversion solutions. This year, the solutions offered were more specific and many offered some form of universal compatibility.

In years past, camera manufacturers offered a variety of chip resolutions and scan scenarios from 480i to 1035i. High-

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Sachtler showed its DV 12 fluid head, which features a five-step fluid damping and a five-step counterbalance system. The DV 12 can handle camera weights between 15 and 27 pounds and is compatible with digital ENG cameras.
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Advanced Digital showed FastStor 22 which can store more than 1.5TB of data at normal 2:1 compression and has the capacity needed to match the rapidly growing storage needs of remote offices, LANs, multiserver workgroups and data centers.
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DNF Controls offered the 4000CL-X , a clip management system offering fast access to more than 400 stored video clips, including one-button retrieval of fill and key clip combinations.
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The VR Archive Streamer uses Leitch's FibreDrive technology to monitor, move, and distribute video files between VR servers and near-line storage for archiving and back-up protection.
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definition 1080i was obtained through upconversion, as very few chips were true 1080i. This year's NAB found several of the camera manufacturers introducing a new high-performance, native 1080i, 2.2 million pixel high-definition CCD. These chips are available in both ATSC-compliant studio and field cameras. Compatibility to the 720p, 480i, and 480p standards is possible through either camera CCU or external down-conversion, and varies by manufacturer. One camera that very clearly illustrates the universal compatibility strategy is the HDK-790D/HDK-79D series from Ikegami. The HDK-790D/HDK-79D series is defined by Ikegami as a "multi-use camera" to meet the format requirements of both high-definition and standard-definition. This series has the ability to simulcast, providing both high-definition video and standard-definition video simultaneously from the CCU in both digital and analog form.

Most manufacturers are also offering system expanders for conversion of field cameras into full-facility studio cameras. The inclusion of copper clad fiber optic cable between the camera head and CCU provides a separation distance of up to 10,000 meters without bandwidth compromise.

NAB99 also saw the introduction of several wide bandwidth-selectable aspect ratio cameras to seemingly further substantiate the universal compatibility strategy. The cameras are available in both studio and field configuration and offer a wide variety of features and considerable flexibility. Most of the wide bandwidth cameras are utilizing a 640,000 pixel IT CCD image sensor. Several of the high-bandwidth cameras are available with component or digital triax communication between the camera head and CCU providing separation of up to 2100 meters. Portable versions also provide multipin connectors for docking to digital or analog recording media.

With its 640,000 pixel CCDs, the Z-3000W digital camera from Hitachi offers strong performance with push-button switching between 16:9 and 4:3 aspect ratios. The advanced new single-chip DSP enhances color reproduction accuracy, as well as providing sharper, cleaner images (850 line resolution).

Thomson Broadcast's new camera at this year's show was the 1707, available in both 525 and 625 versions. IT and FIT 16:9 sensors are available for this lightweight one-piece digital triax camera. The camera offers 12-bit acquisition with 24-bit processing and an uncompressed digital triax link.

Panasonic introduced its AW-E800 convertible camera. This camera offers open-slot architecture and features three 2/3" CCDs. Open slot architecture permits the use of various plug-and-shoot feature cards. It is switchable between 4:3 and 16:9 and is capable of 800 lines of resolution.

Numerous selectable aspect ratio, one-piece camcorders were introduced at this year's NAB. The higher-resolution camcorders incorporate FIT CCD technology with pixel arrays between 520,000 and two million pixels. IT versions of the camcorders incorporated pixel arrays averaging 400,000 pixels. The types of camcorder recording formats were both digital and analog, with each format being manufacturer specific. Among these camcorders, was the Philips LDK150 that carries a DVCPRO deck. JVC had the new Digital-S DY-90, which is lighter than previous versions. Also shown was the production version of the NEC Diskcam, a dockable disk-based recorder (for more information, see Pick Hits, p.74)

High-definition 1080/24p camera technology was shown in prototype form by Sony. The technology is targeted primarily at the cinematography market to utilize electronic cinematography as an alternative to motion picture film. Lucas Film will be the recipient of the first camera prototypes. With the inclusion of its post-production 24p system for video and film, Sony intends to provide post facilities with the capability of producing a 24p digital master that can then be downconverted to all the various digital formats.

Light sensitivity for all the new HD and digital cameras is quite impressive. The new technology CCD cameras now have the ability to resolve low-light and high-contrast scenarios better than the human eye, with minimum illumination being specified by some manufacturers as low as .12 lux.

A look at lenses

Changes in camera technology have also mandated changes in another

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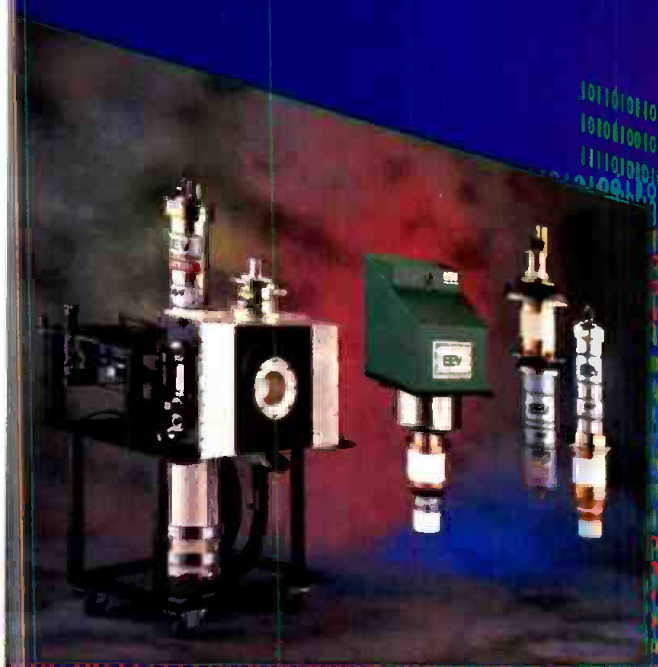

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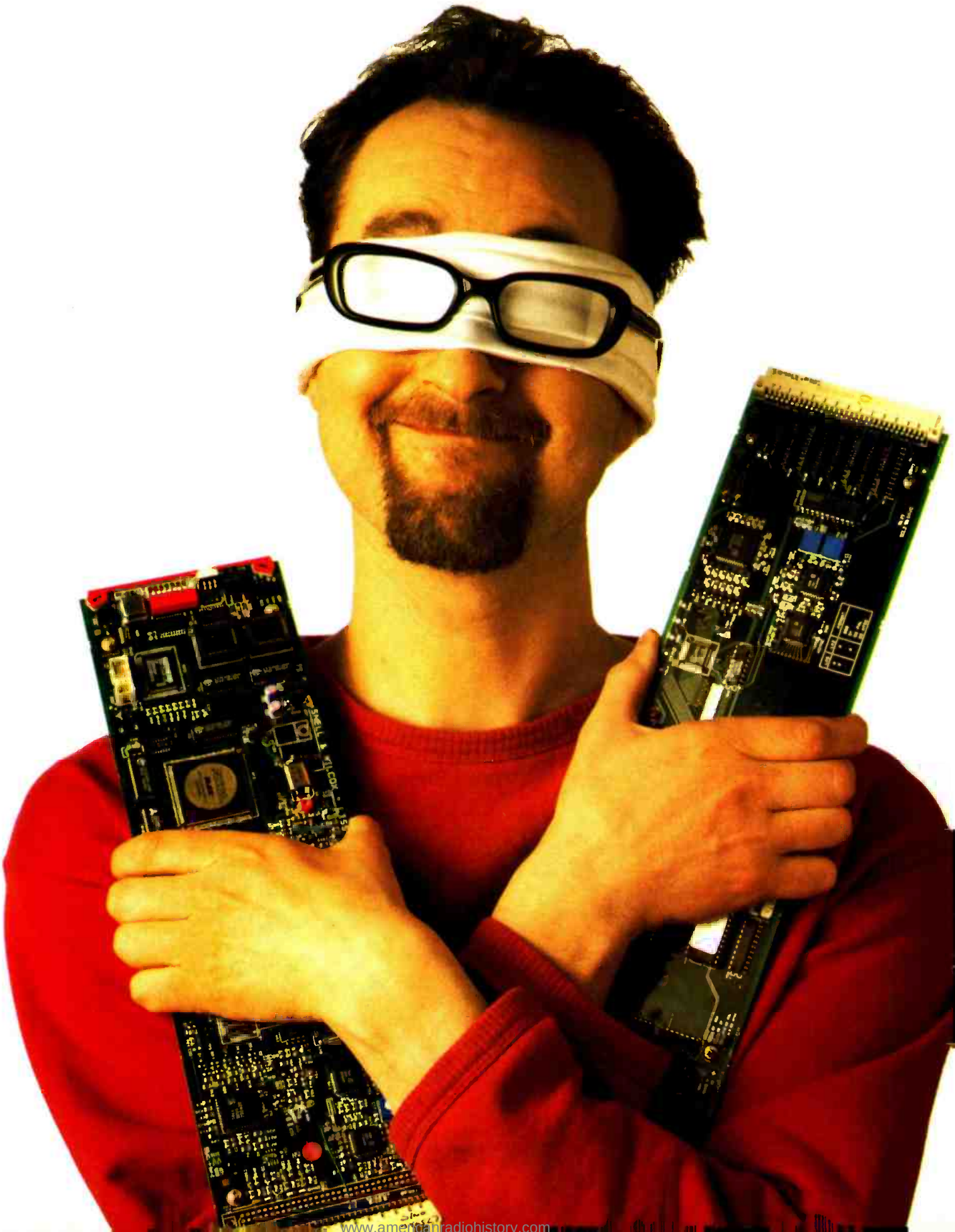

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Videoframe showed its Tally Expander, a general-purpose tally expansion unit that offers 32 relay outputs, expandable to 64 relay outputs; 16 opto-isolated GPI inputs expandable to 32 and single channel and multichannel operation.

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Sprocket Digital's entry, a solid state telecine sensor, replaces existing PMTs in Cintel URSA and MKIII telecines. This sensor system allows all Cintel telecines total advantage of sensor technology similar to that used in Cintel's C-Reality.

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Philip's showed CleverScheduler, which, when interfaced with a traffic and scheduling system, manages and configures play-out equipment, including IP-DVB gateway, IP video servers, data carousel players and IP tunnels.

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Faroudja introduced the DVP2200 digital video processor. The DVP2200 converts interlaced video to high-resolution, progressively scanned signals. The unit also features scan rate scaling to 480p and 600p and internal aspect ratio control.

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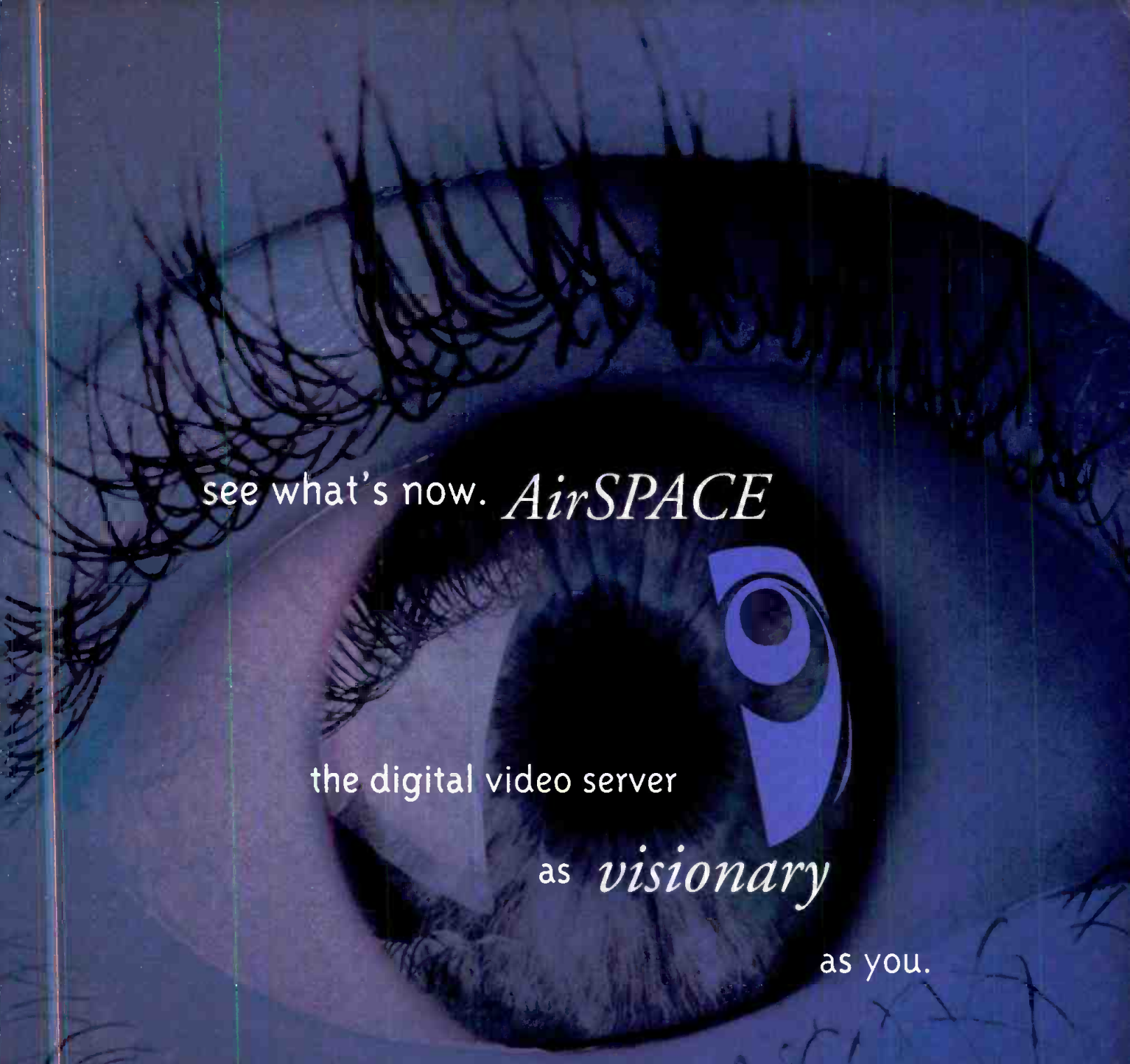
technology — optics. Dual aspect ratio cameras effectively utilize two different size active chip areas for the 16:9 aspect ratio and the 4:3 aspect ratio. Because the 16:9 aspect ratio consumes the larger active area, lenses are optimized to the larger chip area. Unfortunately, when the camera aspect ratio is changed to 4:3, the image exiting the lens is now overscanning the active area of the CCD because of the reduction in the size of the active area. As this problem developed, lens manufacturers began including a mechanically operated .8 reduction device in the lens. The .8 reduction optically corrects for the overscan problem and restores the lens to actual 4:3 characteristics.

New lens technology came in the form of new lenses and some unique new features from several manufacturers. With field cameras becoming smaller and lighter, lens weight and size have become an issue. Last year, Canon introduced a new lens element named the Xs (pronounced excess) element. The Xs element is used in conjunction with the Canon Power Optical System. It reduces a wide range of chromic aberrations and allows production of a more efficient and physically smaller lens. This year, Canon introduced a 16x version of the Xs lens technology. The new lens also incorporates a new feature — Servo Zoom Override. This feature allows the camera operator to manually override the servo zoom control without disengaging the servo control, and is designed for immediate manual change in zoom excursion speed. Canon has also introduced a new wide-angle 12x zoom lens in the IFpro series. The lens incorporates a three-group internal focus lens configuration that greatly reduces the zoom breathing effect normally associated with lens focusing. A new lower-cost HD lens is now available from Canon. The 125x lens incorporates the Xs element technology, and contains a digital zoom and focus servo system. The lens also contains a constant angle focusing system that uses a 32-bit processor to control the zoom breathing effect when focusing.

Fujinon introduced a new digital servo control system that is incorporated in the Digi Power series of zoom lenses. The new servo control technology has provided for several new and advanced lens features. Constant zoom excursion speed has always been dependant on the camera operator's ability to maintain even pressure on the zoom rocker switch. Fujinon's new Cruise Zoom feature allows the camera operator to set the zoom speed by a button depression during the excursion, thereby locking the servo into a constant speed. The new servo control technology also incorporates an RS-232 port for connection to an external computer for robotic and virtual production applications. Fujinon's Digital Quick Zoom feature allows the operator to check focus rapidly by zooming-in and pressing a button that automatically returns to the original zoom position. Digi Power technology also incorporates technology to control the zoom breathing effect by synchronizing the zoom movement to the focus movement. New lenses from Fujinon that incorporate the new Digi Power system include two new 22x lenses. They both feature a maximum 172mm focal length and a wide-angle view of 58.8°. One of the two new 22x lenses is designed for dual aspect ratio applications while the other is designed for 4:3 applications. The Digi Power series now includes a new 24x EFP lens and two lenses specifically for high-definition. The 15x high-definition lens is their first to be directed at the ENG market. The new 26x high-definition lens provides a maximum focal length of 350mm with the 2x extender, and wide, 71.37° horizontal range in high definition.

Angenieux introduced the Digital Option for its studio and sports lenses. The option provides several new features including three levels of lens focus sensitivity, five zoom speed presets, zoom breathing compensation, illumination ramping limits, and an on lens diagnostics display. The digital option can also be upgraded as new software becomes available. Angenieux also introduced several new lenses, including a new sports lens with a focal length of 684mm. Other new lenses from Angenieux include an 11.5x cine style lens and a 10x lens with an 84° horizontal field of view. Both lenses are targeted for the high-definition market. Angenieux's new HR series lenses include a wide angle 12x and a 15x lens. The new high-resolution lenses are targeted for digital broadcast cameras.



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Camera accessories

Cameras used in the field need batteries and support. Regarding batteries, Anton Bauer was showing their Hytron 50 and 100 batteries along with the new PowerCharger Model 2300 which includes a universal switchable power supply output for 6- and 12V batteries.

Cool-Lux introduced the Delta Force, a battery charger for MiMh and NiCd rechargeable batteries with global AC power inputs. The Delta Force can be used for any NiMH or NiCd battery packs or power belts up to 10AH.

IDX Technology demonstrated the KL-2, a battery charger that can charge two IDX lithium batteries in three hours with the full-power charging method.

On the support side, Vinten launched its OB Quattro pedestal and Vision 250 pan & tilt head for studio/OB applications.

Bogen Photo showcased the G1380 series, a range of video fluid heads designed for ENG/EFP, portable digital super-lightweight DV cameras. The G1380 can accommodate cameras between 2.2 and 22 bounds and features separate pan/tilt variable drag control for smooth, repeatable movements. Bogen also displayed the Manfrotto 501 Pro Video Head, which is designed for smaller ENG and digital cameras and features 360° pan and +90° pan to -60° tilt.

Beyond cameras and lenses, virtual sets were on the show floor in ever growing numbers, and in some cases, reduced prices — even reduced size. Orad Hi-Tec was showing their Micro Panel portable sets, which allow the insertion of animated 3-D graphics and video sequences onto a small two-tone mobile panel.

This year's offering from Radamec was the Free-d, a virtual studio tracking system offering high performance and flexibility for tracking free moving or hand-held cameras. It uses coded targets placed in the studio lighting grid to calculate the exact position and orientation of the studio camera.

For more information, circle (456) on the Fast Fact Card.

Bob Bergfeld is president of Presentation Systems Design, St. Louis, MO.

By Edward W. Fraticelli

Over the past few years, dedicated black box post-production gear has become less prevalent on the NAB exhibition floor. The advantages of general-purpose, platform-based production systems have slowly displaced the costlier single-purpose boxes that once made up the majority of post suites. But this year, the black box saw something of a resurgence, with HD production gear topping many NAB shopping lists. The processing speed required for moving the substantial amount of data in today's HD signals is requiring many to look to the faster, dedicated hardware/firmware combinations that these systems offer. Many of the switchers, DVEs and various graphics devices found at this year's NAB are being offered in this form.

HD products

Sony, for instance, showcased a complete HDCAM editing system at its demo center adjoining the main convention floor. Here, updated models of the HDS-7000 switcher and the HDME-7000 digital video effects system were assembled into a working post environment. Even more interesting was Sony's display of 1080 line/24 frame progressive scan post system. The exhibit displayed 1080i/24p material playing on a HDW-F500 HDCAM recorder/player, natively at 24 frames (48Hz segmented frame display), at 1080/60i and 480/60i, all from the same VTR without external converters. A separate Sony scan converter was used to derive 720/30p and 480/30p signals. All of this showed how the newly-proposed 24 frame mastering format really could deliver all HD formats that may be required for DTV.

Over at Panasonic, 1080/24p signals were playing on a modified HD-D5 player, then converted through a Panasonic Universal Format Converter (UFC)

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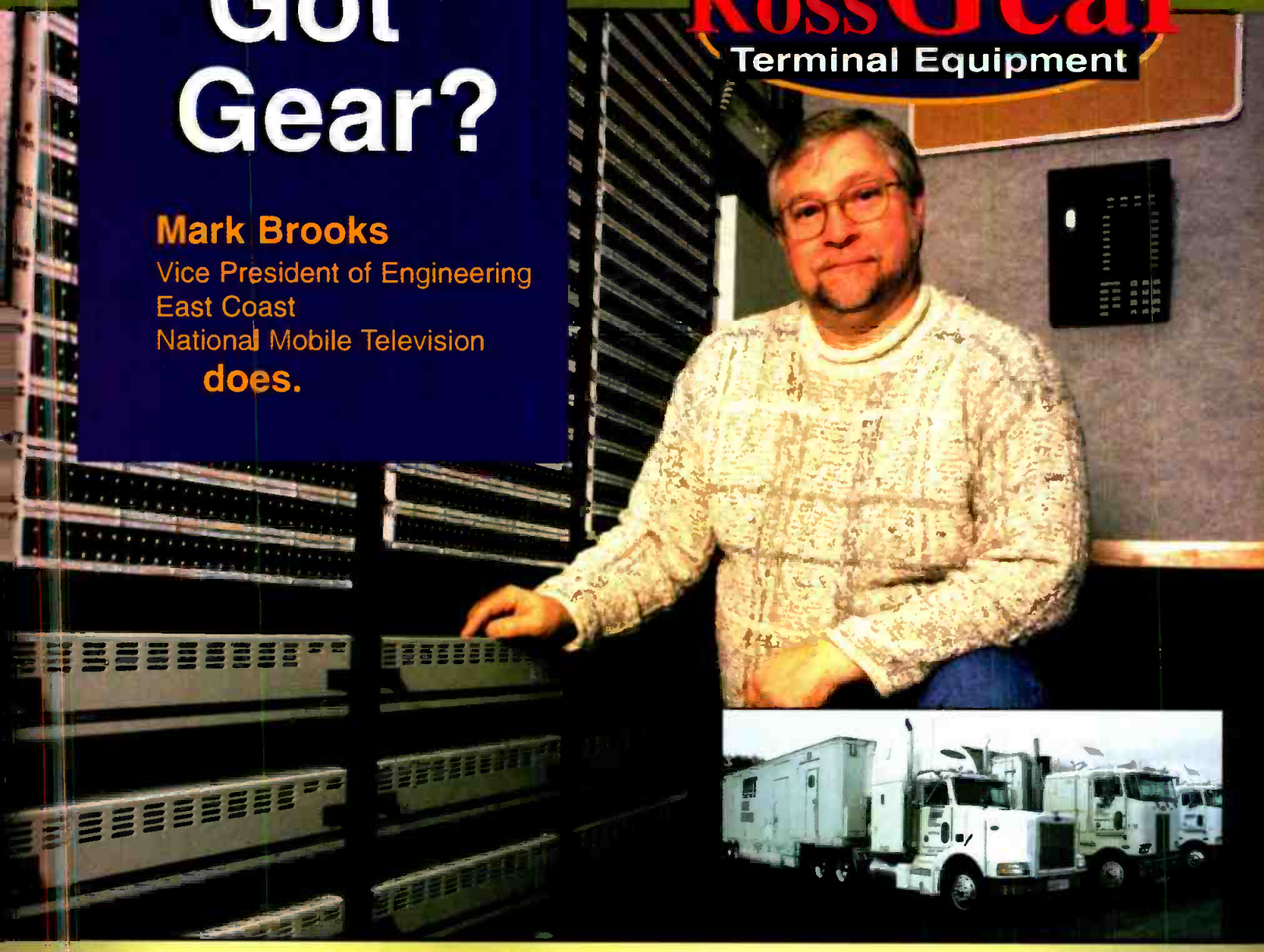

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Odetics showed eDETICS, which will provide video content owners with new revenue opportunities by allowing buyers to search, preview, purchase and take delivery of archived video clips on demand via the Web.
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StorageTek showed the 9840 tape drive storage system, which uses ultra-high track and byte densities, moves the media at 2M/second and provides an uncompressed data rate of 10mb per second.
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Sarnoff featured its DS-CC digital studio command and control, which allows users to manage multiple resources in real time, including servers, tape players, network streams and system users, and work with video, audio, data essence and metadata.
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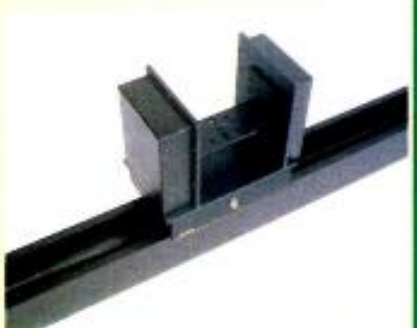

Telemetrics showed the LTS linear trolley system, which provides smooth variable-speed camera movement and quiet operation. Both motorized and manual versions are available.
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to any HD flavor desired. Panasonic also showed the much-anticipated DVCPRO 100 VTRs, with the AJ-HD150 model available for delivery later this year. These 100Mb/s recorders can record and play at 1080i as well as play back DVCPRO50 and DVCPRO tapes and internally upconvert them to high definition.

In the JVC booth, they were showing Digital-S, which has recently been given the D-9 designation from SMPTE. Digital-S (D-9) operates at 50Mb/s. The new D-9 HD format is a 100Mb/s extension to Digital-S that provides HDTV recording and playback at 720P and 1080i.

Tektronix entered the HD market with the Grass Valley 110HD production switcher. Selectable between 1080i and 720p formats, the 110HD will appear very familiar to those who have used the Grass Valley 100 series analog switchers. The switcher is ideal for small production suites and HD telecines. It includes features such as two internal frame stores, all in a small 3RU chassis.

Snell & Wilcox offered an extensive line of HD conversion products, and featured its new line of HD production switchers. The three models, the HD1010, HD1012 and HD1024, offer from eight to 24 inputs and three HD keyers. HD framestores, RGB color correctors and programmable timelines round out these switchers' standard features. All three models are 1080i / 720p switchable for maximum flexibility.

At Quantel, the famed Editbox, repackaged as the Editbox FX, replaces both the Magnum and the Platinum systems, which are no longer available. This very capable system boasts a sizable palette of effects, four-layer compositing, onboard Paintbox, automatic background loading via Clipnet and color correction functions at a price point midway between its two ancestor systems. Quantel has provided a way for Editbox FX owners to step into the world of high-definition by offering the Chaser, an add-on system to provide HD production without replacing the entire system. The Publisher HD provides automatic conversion between resolutions. Quantel also displayed a 1080/24p post system on an upper floor, showing how this format can be used in film-based productions.

The HD version of Discreet Logic's Fire post-production editing/effects system offers near real-time speeds and nonlinear disk-based HD editing capabilities. Based on the SGI Octane platform, Discreet has teamed with Sony to offer HDCAM codecs on the I/O boards to allow direct transfer of HDCAM signals to and from Sony HD VTRs. All of Discreet's well-known post tools can be used on the HD system, including the use of SPARKS plug-ins, and automatic conversion of standard-definition signals when imported into the HD Fire, over-the-wire digital network system.

Chyron's interesting approach to the Duet HD platform could be seen performing several post functions. This Intel processor-based open platform system offers high-speed processing specifically tuned to video manipulations, allowing other parties to develop software to run on the system. The Liberty digital paint and animation system was demonstrated, along with Chyron's Lyric character generator software package. Other companies are slated to develop Duet software, as well as using Chyron's CAI. open API development software.

Over at the Pixel Power booth, the Clarity HD platform was shown for the first time. Clarity offers the functionality of the Collage character generator and graphics system in a fast, custom architecture that can handle real-time animation of HD graphics elements.

Leitch showed its Monarch aspect ration converter. Monarch's architecture allows I/O processing to be configured to match the demands of the application. It offers 10-bit digital decoding and encoding for processing composite video signals, and features 10-bit resolution, preset and variable ratios, selectable transition types and serial I/O. It is offered in 1RU frame.

Viewgraphics offered its Viewstore 6000 DV image sequencer offering HD serial I/O capability and increased storage capacity.

Avica was showing the Vecta DTV still store, a unit that offers expanded broadcast features and supports HD formats including 480p, 720p, 1080p/24 and 1080i. The Vecta also features time-line functions including play-list

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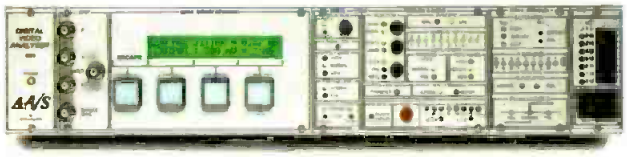

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Angenieux offered it Cine HD lens, featuring T1.9 aperture with minimum ramping; minimal breathing effect, and 0.6m minimum object distance (measured from the film plane).
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Play introduced its Pocket Producer portable logger and editor, which allows logging of clips during or after shooting on location. Palm Pilot-based unit can record timecode from LANC, RS-422 or LTC, add comments, then download to any desktop system.
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The DS1100 from SGI houses up to eight individual hard drives and can be purchased in an upgradeable JBOD or RAID configuration. Users can start with as few as two disks and expand the array incrementally as capacity requirements increase.
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Neumann showed the KM 180 series, which features similar transformerless circuitry as used in the KM 100 system. Output is balanced and phantom (48V) powered.
Circle (380) on Free Info Card

creation and playback sequencing and remote control operations.

SD systems

Of course, all of these HD product showings still left plenty of room for innovations in the SD product arena. SD production will still be around for plenty of time to come as the availability of 480i equipment continues to flourish. Switchers saw such advanced features as integral frame stores, color correctors and internal DVEs. Digital video effects processors contained more and more sophisticated effects, such as light sources and shadows. Many more specialized devices could be found for applications such as telecine suites.

Ross Video Systems premiered its Synergy line of digital switchers at last year's NAB. This year saw further advancement of the line. Ross' big news was its switcher's built-in Aspectizers, an aspect ratio converter enabling 16:9 and 4:3 production to occur simultaneously. These converters are placed in every input and output path to enable mixing video sources of both aspects. Also, the Ultimatte Insider option provides an authentic Ultimatte compositer on up to eight keyers. New video/audio server control and dual-border generators round out Synergy switcher's offerings.

Philips added the huge DD35 live production switcher to its DD line. With enough buttons and readouts to please any tech director, the DD35 has up to 48 SDI inputs, three mix/effects banks and up to six downstream keyers. Philips' exclusive FXLoop feature provides integration of nearly any DVE available today. User preferences and switcher setups can be saved on an internal hard disk drive. The DD35 joins a complete line of production switchers, from the DD10 12-input, single M/E on up.

Echolab added the model 5900 and 5800 to its SuperSwitcher line of digital production systems. Echolab's switchers feature an integrated NT computer subsystem, allowing direct integration of plug-in third party modules such as Pinnacle's Genie DVE and Inscriber's CG and DPS Clip Store. The 100BaseT Ethernet port allows integration of external manipulation devices including the Pinnacle DVEXtreme, TypeDeko and the HP Video Server. Add to this system a V-LAN control bus for VTR control and the SuperSwitcher can be a complete post production system. New for '99 is the Commander, an interesting tool that extends the SuperSwitcher's versatility. Up to six Commanders can be attached, each completely programmable to control any switcher function on 18 different multicolor buttons and a four-line display. The user-friendly programming system makes the Commanders easy to configure.

The Masterkey 7 from Broadcast Video Systems Corp. provides a versatile SDI linear keyer in a single rack unit package. It is useful for telecine suites, small production systems and even as an add-on downstream keyer to an existing SDI switcher. Another handy item was the KCT-50 from Horita. This keyboard controlled titler is capable of adding nine lines of 20 characters each with no PC or PC software. Up to 25 KCT-50s can be connected together, addressed and controlled from a single keyboard.

Play showed more developments on its Trinity integrated digital production system in a variety of actual live production applications. Trinity showed the second version of its software that offers a 601 production switcher, DVE with real-time reflection mapping and a 4ns character generator. Options can be added to the basic system to provide nonlinear editing, virtual sets and audio mixing.

For-A Corporation showed its VPS-400 video production system, a combination of video mixer and DVE, as well as a combination of digital component, analog component and analog composite.

Evans & Sutherland introduced the Tornado 3000, a graphics workstation that provides resolution support up to 1920x1200 for 16:9 aspect ratio monitors. The Tornado 3000 also features texture fill rates of 100Mpixels per second and a 30MB 3DRAM frame buffer. Anytime you are working with workstations, or any computer for that matter, a UPS is a good idea. MGE UPS showed its Pulsar EX, a rack-mounted version of its Pulsar UPS units offering optional long-duration batteries and full-time, seamless voltage regulation.

Forecast Consoles introduced the Image Master, a series of modular components and custom-designed furniture for the broadcast environment. The Image Master includes modules that are molded and customized around existing equipment and space.

Winsted had their new line of Digital

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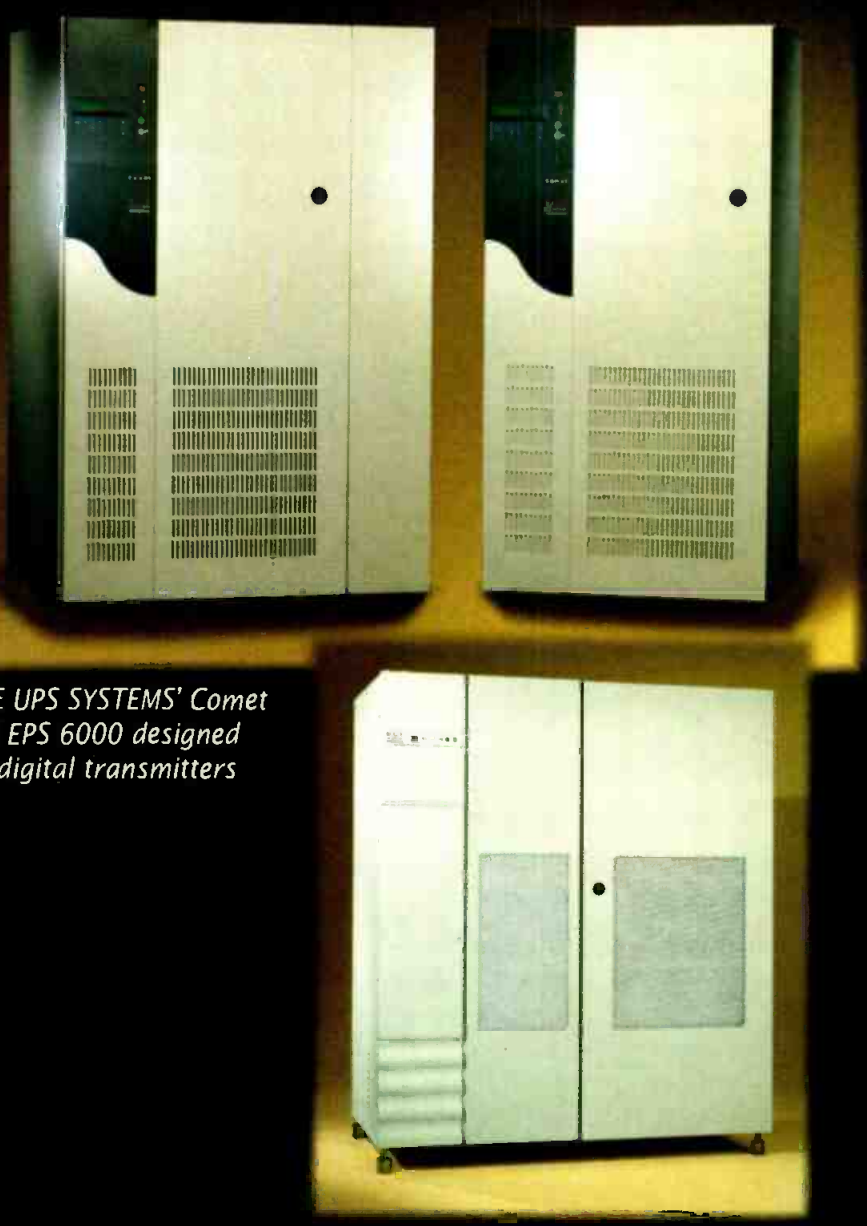

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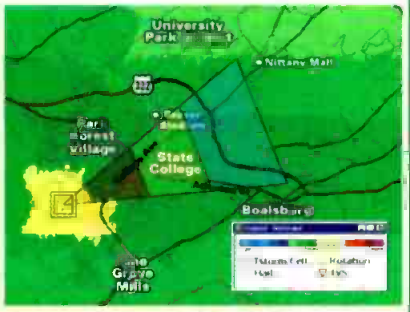
Miller Fluid Heads showed the DS30, a 100mm ball leveling fluid head featuring a quick release plate for fast pull-downs and set-ups, telescopic pan handle, and four pan and tilt selections to give operators a wide range of repeatable drag settings.
Circle (374) on Free Info Card

Mindport showed its M-Crypt Schedule, a program scheduler that allows the importation of scheduling info from other sources, and its M-Crypt EPG, which allows the compilation and insertion of DVB-compliant SI into an MPEG-2 transport stream.
Circle (375) on Free Info Card



Accuweather showed its FirstWarn Neighborhood NEXRAD, a radar and weather system that allows users to customize weather forecasts from the national level to the city street level. System allows broadcaster and viewers to track and time storms.
Circle (325) on Free Info Card

Desks at the show, these new desks are designed for both linear and nonlinear systems. These ergonomic, multifunction workstations provide a comfortable and efficient workspace environment.

Princeton Video Image showed the Series 7, the latest generation of its Live Video Insertion Systems (L-VIS), which electronically inserts advertising or other images in real time into live or prerecorded programming.

Finally, when you are in the middle of production, it is easy to lose track of time. ESE's 5100 series of analog clocks can read timecode and/or operate as standalone or impulse clocks. The 5100 series comes in 5-, 12- and 16-inch models.

For more information, circle (457) on the Fast Fact Card.

Ed Fraticelli is director of engineering for Production Masters, Inc., Pittsburg.

Video editing systems

By Marcus Weise

At this year's NAB there were at least 30 different manufacturers offering video editing systems ranging in price from under $1000 to over $300,000. Offerings ranged from news and simple cuts-only systems to sophisticated units designed for editing video with extensive computer-generated graphics and artwork.

Most systems are designed to work with disk-based storage media, such as VDRs and hard drives. Many of these units provide sufficient capacity to hold several hours of uncompressed video. Also available were hybrid systems capable of interfacing with several VTRs. In some cases, the less expensive systems consisted of software only, leaving it up to the purchaser to decide the hardware configuration. Many systems could be purchased in a basic configuration and upgraded later. Flexibility at this level can reduce the possibility that systems will become outdated as requirements change and technology improves.

Low-cost systems

In the $1000 to $5000 range, EIDOS is offering two software-only systems, the less expensive Judgement and the higher-end Justice. These programs are Windows NT-based, work in MJPEG and use QuickTime effects. They accept composite, component and SDI video as inputs. The Justice includes a DVE.

United Media showed the On-Line Express, an NT-based program available as software only or as a complete system. It can input and output in any format, including an option for SDI. It displays four channels of video but can create 2D and Pinnacle effects in real time on two MJPEG channels and has serial machine control capability.

The Casablanca from Draco is a self-contained nonlinear edit system in a box. About the size of a VHS deck, it can be used for editing on location and uses a standard TV set for its display. This MJPEG system accepts and outputs Y/C, composite and, optionally, DV. Another stand-alone nonlinear system is the ScreenPlay by Applied Magic with real-time effects, titles and four audio channels. I/Os include S-video, composite and, as an option, DV. It has two video streams that can be used for layering.

Adobe is now in version 5.0 of Premiere with 14 new audio filters for better audio control. In addition to working on either Mac or Windows platforms, it also works as an offline system. The interface is improved, offering better support for long-form shows. In:sync has three versions of the Windows 98-based Speed Razor: the new SE, the S and the RT. The SE is a real-time system with multiple layers for effects, multitrack audio mixing and 3D DVE.

Pinnacle has a new MPEG-2 PC-based system, the DC1000 and the DVD1000. Both programs have real-time playback of effects and titles. The main difference between them is that DVD1000 is designed for DVD authoring.

Mid-range systems

In the $6000 to $20,000 range, Play has the new Time Machine software

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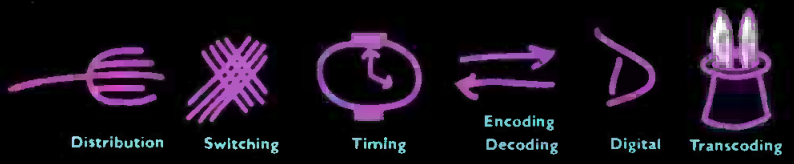

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Circle (77) on Free Info Card

that runs with the Trinity 2.0 version on Windows NT. A dual-channel system, it combines nonlinear editing with compositing, paint, animation and live production capabilities.

Matrox has the Realtime Pro-Edit workstation that comes as a completely integrated NT system on a Compaq computer running Adobe Premiere, Boris FX and Inscriber CG. Pinnacle offered two nonlinear systems in this price range — the Reel Time and the Reel Time Nitro. Nitro is an online upgrade with real time 3D effects.

The OZ-4.0 from Videomedia is a Windows-based linear editing program that, in its full configuration, can control up to eight machines, a video switcher and audio board. The Gravity from DPS is an integrated PC nonlinear system that can create up to a 99-layer nondestructive composite in a single render pass. Sony offers the DNE900 news editing system and the BVE2000 linear editing system.

Applied Digital Technology brought out the ADeditFX nonlinear system that works with real-time MPEG-2 2D and 3D effects and transitions with any standard video format in or out. Fast has the NT-based 601, a real-time, dual stream MPEG-2 nonlinear editing system that takes any standard format in or out. The Fury SX from Blossom is a Windows NT turn-key system with real-time transitions, keying, titling and 2D and 3D DVE effects.

Media 100's Finish is a completely integrated, cross platform nonlinear system that can handle up to eight simultaneous real-time effects. It handles any standard video format in and out and comes in a variety of configurations that go from basic assembly editing to broadcast quality, long form finished product.

In the $20,000 to $50,000 range, JVC's MW-S1000U is an MJPEG-based, multiformat in and out online quality system with real-time 2D and 3D effects. It is a single unit turnkey package. Panasonic has two systems: the DVedit which is a lower cost DVCPro edit system and the original Postbox 2000 which has two video streams and will do real-time 3D effects.

Tektronix and Avid teamed up to create the AVStar. In this form, the original Newscutter integrates with the Profile video server for both editing and playback. It is available as a cuts-only system or as expanded forms incorporating wipes and dissolves and an effects system. Editware has a new system, the DPE-500, which also works with the Profile to create a linear/nonlinear hybrid. The system is NT-based and uses MPEG. It interfaces with a switcher and an audio board and retains the traditional linear-type edit screen rather than a time-line. The use of the Profile allows edits to be moved in a nonlinear fashion.

ETC's Ensemble Gold Multi-Linear uses the Profile to create a hybrid linear/nonlinear environment. The display is also a hybrid showing both the traditional timecode screen and a time line display. It can handle four video streams at once. They also offer the Cut/Time with the Profile that allows editing to begin while still recording.

Sony was showing the ES-3 and the ES-7. The ES-7 is an NT-based linear/nonlinear hybrid with two video streams that can be used to composite layers. The ES-3 is nonlinear system that allows for unlimited layers of rendered effects.

The Vibrint NewsEdit is a hybrid system that is specifically designed for news editing. The system can be networked so that several editors can work with the material at the same time

Discreet Logic's Edit is a real-time 2D and 3D effects editor with up to 99 video tracks that can used both for offline and online. It integrates with Discreet's Paint and Effect to allow creation of complex graphics and images. Editing can continue while the effects are being created, minimizing waiting during rendering.

Blossom's system, the Fury X2, is a dual-monitor, real-time nonlinear system with 3D effects that is an unpack and plug-in package.

The Accom Axial 3000 is a hybrid system that is an uncompressed, real-time online edit suite. It combines hard drive capabilities with machine and switcher control that allows editing in both environments at once.

In the $50,000 to $100,000 range, Accom offers the Stratasphere 3.0 version with several improvements in the program that smooth out and speed up its operation. For news editing, Panasonic's NewsByte is an NT-based high-end nonlinear news editing system with real-time 3D DVE, lighting effects and

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Omnibus unveiled GAMMA, Global Asset and Media Management Applications. GAMMA allows users to access OmniBus databases, online media archives, and dubbing and routing systems through a Web browser.
Circle (382) on Free Info Card

ANDATACO Announced the first product from its collaborative agreement with Micron, the LVD/Ultra2-based Micron DataFRAME 450, a scaleable, high-performance storage solution.
Circle (331) on Free Info Card

SkyStream showed the DBN-25 Integrator, a system that provides data delivery services for multiple points. The DBN-25 can be be used for Web caching, high-speed Internet delivery and combining data with MPEG-2 audio/video streams.
Circle (404) on Free Info Card

Clear-Com showed its SmartLink linking cards, which allow System 200, Compact 72 or MicroMatrix systems to be intelligently linked, giving users with one system the ability to communicate with users in another system with one key action.
Circle (342) on Free Info Card

Canon introduced its J16ax8B IRS/IAS IFxs lens, a 16x lens that allows manual override of the servo zoom control, maximizing operational freedom.
Circle (338) on Free Info Card

The RFE shown by Media 100 consists of a 300MHz G3 PowerBook with 192MB of RAM, 8GB internal hard drive, a 14.1" active matrix display, and colored EZ Keys for Media 100 editing shortcuts.
Circle (373) on Free Info Card

character generator.

Pixel Power's Collage is an uncompressed nonlinear edit system with built in DVE. It has a single channel of video with real time cuts-only editing along with rendered wipes and multiple DVE layers. Text, graphics and animation effects are handled in real time on a separate time line layer.

In the over $100,000 range there is the new Avid 9000 and the 9000XL. These systems are nonlinear television and film editing systems that can work at 24, 25 and 30 frames per second. They also handle multicamera requirements.

Quantel's newest version of the Editbox, the FX, is an uncompressed nonlinear system with four video layers, 16 audio tracks and a Paintbox. It has an option for 24 frames per second for film editing. Later in the year Quantel will offer the Chaser option for HD to enable real-time HD editing.

Philips brought the EditStream, which is a nonlinear network system designed for news editing that allows editing to begin while material is still being captured. Up to 100 edit stations can access the material concurrently.

For more information, circle (458) on the Fast Fact Card.

Marcus Weise is a post-production supervisor based in Hollywood.

By Roy W. Rising

With each passing year it becomes more difficult to expect the NAB Convention to grow bigger, brighter and better — yet it does. The completion of the new North Hall at the Las Vegas Convention Center seemed to ease congestion while increasing the number of exhibits. Here's a look at some of the new offerings in the world of television sound.

Important new products from 360 Systems were, for me, the highlight of the show. The TCR4 and TCR8 are synchronous digital hard disk recorders. Offering four and eight channels, these systems are aimed at the center of video production. Both models provide 24-bit audio, large internal storage and high-density removable disks. Complete timecode implementation and VTR emulation are included.

Building on 360's DigiCart file management and Short/Cut editing features, the TCR4 outperforms DAT and audio-dedicated VTR systems. The added channels of the TCR8 are ideal for 5.1, L/R mixes and multiple language production. Editing abilities include selectable cross-fade lengths, dynamic edit marking, preroll, edit in, edit out and post-roll. A RMW (Read-Modify-Write) feature aids layering and mix-down.

Digital and analog I/O, versatile remote control interfaces, a large display screen and keypad for titling and file management are among the many other user-friendly features.

Mixing gear

New from Roland is the V-Mixing System. It allows the console and I/O-processor units to be separated by up to 650 feet, connected only by two standard AES/EBU cables. This eliminates bulky infrastructure wiring between studio and control room. Systems having up to 94 channels of digital mixing and eight stereo effects provide motorized faders, 5.1 surround and full automation.

Euphonix announced the enhanced CS3100B on-air mixing system. Monitoring features include simultaneous 5.1 and Dolby Matrix stereo and mono outputs. A new GPI interface enables audio-follow-video, fader cart start and server triggering, tally responses for external inputs and automatic input muting during tape winds. Tally-back visual monitoring of all GPI activity and 32 assignable outputs are also included.

Solid State Logic showed its newest, the Axiom MT mixing console, featuring up to 96 fully-featured channels, 48 multitrack buses, 12 main mix buses, 12 aux buses and over 200 mix returns, with every control dynamically automated.

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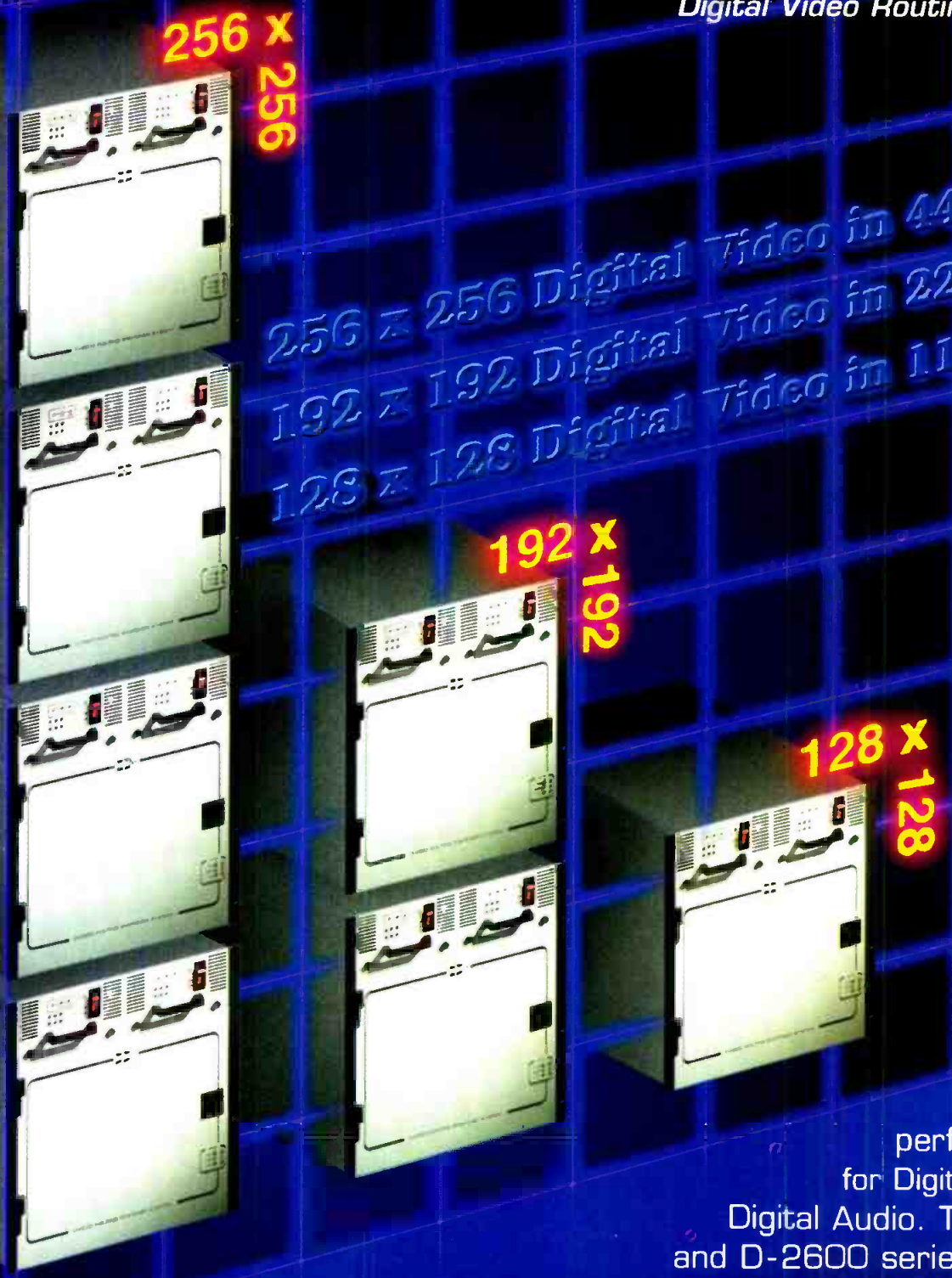

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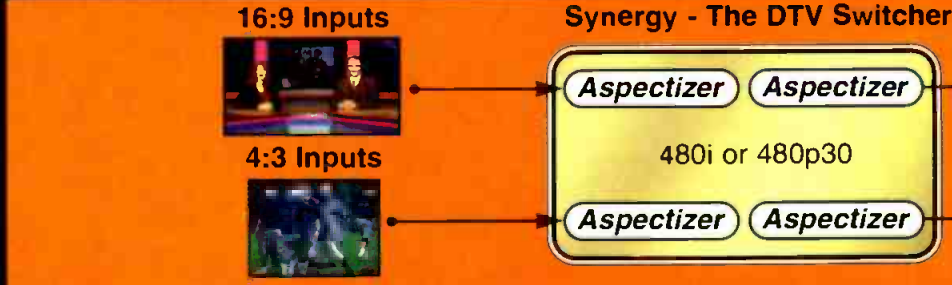

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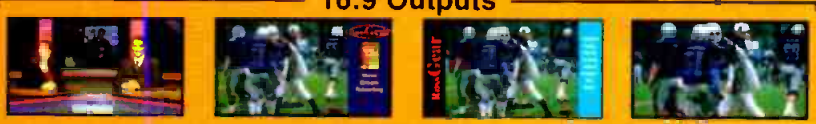

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product jackpot

Omnibus introduced the Feed-Brow, a stand-alone desktop browsing system. Designed for small to medium stations, Feed-Brow allows broadcasters to review materials before tape is taken to the edit suite. The system can be upgraded to the Hy-Brow system.
Circle (383) on Free Info Card

Systems integrator A. F. Associates demonstrated technology that provides for the centralization of programming and master control for multiple stations, giving access to close integration of playout facilities for an array of head-end environments.
Circle (322) on Free Info Card

DEC-312, shown by Fortel DTV, decodes composite analog and generates four SDI outputs. The 12-bit A/D conversion and processing offers users an improved S/N. The digital comb filter uses adaptive frame, field and 3/5 line modes for accurate YC separation
Circle (357) on Free Info Card

Evertz was also displaying its 7710MD, an HD downconverter for monitoring 1.5Gb/s signals on a standard-definition monitor. The unit accepts 1080i or 720p input and offers four outputs of two 1.5Gb/s reclocked outputs, two NTSC or two serial component.
Circle (351) on Free Info Card

Soundscape Digital showed its Mixtreme WinNT PCI sound card, featuring 16 I/Os, external high-quality breakout converter boxes and bundled mixing software from their high-end post and broadcast workstations.

Harrison/GLW introduced the new TV5.1 production console directed at DTV operations. Modular in architecture and available in five frame sizes, the system is aimed at broadcasters not yet ready for wholesale digital conversion. Important features include integral 5.1 surround panning and monitoring buses, multiple mix-minus options with talkback, and either mechanical VU meters or switchable VU/PPM LED array meters. Mono input modules provide two mic and two line inputs; stereo line input modules have two stereo line inputs. Four-band EQ and compressors are available with every input.

Otari showed its PicMix multiformat, surround sound monitoring system, which offers flexible monitor reassignment, calibrated SPL output control and scalable system architecture.

Wheatstone showed its TV-80 audio console, with optional preselector system that provides up to eleven inputs per channel and can communicate with station router. Also on display was the D-600, which is available in sizes up to 40 positions.

Yamaha showed its D24 digital multitrack recorder, which offers 16-, 20- and 24-bit, eight-track simultaneous record and play capability at 44.1 and 48kHz sampling rates, and four-track record/play at 96kHz. Additionally, the D24 offers modularity, all the benefits of nonlinear editing, and the convenience of removable media.

Many production facilities have separate music and sound effects rooms that feed the main audio control room. A very good way to maintain quality and versatility in these areas is to employ products developed for radio. New from Ward-Beck Systems is the R2K series digital radio console. Delivering 20 and 28 input models, installation is simplified by use of Phoenix pluggable connectors throughout. A unique power supply package provides dual redundancy and allows use of WBS' excellent D/A and A/D converters and DAs in only two rack units of space.

Pacific Research and Engineering debuted the Integrity 16 input mixing system. All inputs accept either analog or digital signals. Acceptance of any sampling rate overcomes conversion problems from a wide range of source equipment. Metering and information displays are combined on an LCD color monitor. Each input has a 10-character alphanumeric display for labeling. Setup parameters may be saved, allowing quick transition between various types of production.

Microphones

Electro-Voice introduced a new ultraminiature condenser clip-on mic, the RE90L. Improved EMI/RFI suppression is achieved by placing an insulated copper foil wrap around the circuitry. The entire circuit module is further enclosed in polycarbonate resin that forms a very lightweight, yet highly durable package.

Also new from Electro-Voice is the MS3000 Diversity Wireless Microphone System. Using EV's DXN companion providing 104dB S/N, the performance compares well with hard-wired mics. Hand-held and body-pack transmitters are available with a broad choice of mic elements. Operating in the UHF range from 690 to 720MHz, each single frequency system comes with specially tuned quarter-wave antennas employing rugged TNC-type connectors. Rack mount kits are available for the receiver and antennas, as are multicouplers and half-wave and log periodic directional antennas.

Audio-Technica presented the AT895 Adaptive-Array mic systems. Developed to minimize ambient pickup while capturing the intended source, this DSP controlled system uses acoustical, analog and digital filtering to achieve up to 80dB of cancellation. The outputs from five elements are fed through a detachable seven-conductor cable to the AT895CP Control Pack, which provides power, digital processing and control for the mic. The Control Pack provides pattern and filter selection, headphone jack with volume control, and LCD battery condition display. In addition to a three 9V click-on battery housing, 12V power may be delivered through a standard four-pin XLR connector.

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Evolving Video Technologies' Anteo3D graphics system features multiple font and logo formats, audio and video clip playback, style markers, real-time page-based and DVE effects, multiple HD format support and real-time HD output.
Circle (354) on Free Info Card

Thomson spotlighted its MSE 5000, a multiservice encoder which performs HD and SD encoding and supports 13 ATSC input formats from 1080p to 480i using the same hardware.
Circle (430) on Free Info Card

Leitch showed BrowseCutter which provides an MPEG-1 shadow version of every clip stored in the VR300 or 400 broadcast server. Users can build rundowns, edit scripts, search wires, browse video and edit from their desks or multiple remote locations.
Circle (369) on Free Info Card

Sierra Video Systems showed its GRIP series of graphical router interfaces. GRIP is composed of three groups of Windows95/98/NT programs: GRIP Lite, GRIP Pro, and GRIP FM.
Circle (431) on Free Info Card

New from Shure is the WL61 Series subminiature clip-on mic. Frequency response is 20Hz to 20kHz. Available in black or tan, each unit comes with two interchangeable grills, which are easily attached, removed and cleaned as required. One grill is for head-worn applications and provides 3dB boost from 8-20kHz. The other, for chest-worn use, delivers a 10dB boost at 12kHz. Designed for wireless service, the six-foot cords are terminated in either Switchcraft TA4F or LEMO connectors.

AKG Acoustics introduced a new, affordable large diaphragm condenser mic, the C4000B. Featuring a true one-inch gold-sputtered mylar dual capsule, this mic is packaged in a rugged wire grill with an additional internal windscreen. Standard 10dB internal attenuation and low cut filtering are selectable. Omni, cardioid and hypercardioid patterns are provided. An optimized transformerless output stage protects LF accuracy and has very low self-noise.

Vega offered its EMP series of wireless microphone receivers, featuring frequency agility, audio control and the ability to reprogram UHF frequencies as often as needed.

Azden debuted the 411DRH UHF receiver and the 400UDR portable UHF receiver. The 411 UHF receiver features 63 user-selectable UHF channels, twin removable antennas, balanced XLR and an unbalanced one-fourth inch ouput connector and a 12VDC power connector. The portable 400UDR also offers 63 user-selectable channels, LED indicators for AF peak, XLR output with volume adjust and operates with four AA batteries or a 12VDC connector.

Serendipity

One of the bonuses of walking the convention floors is the discovery of many good things you were not seeking. Here are a few of the more interesting ones.

Directed at nonlinear video editing, Antex Electronics presented a family of high quality 20-bit audio hardware and software. StudioCard 2000 delivers full four-channel I/O and 32-bit mixing precision. Absolute synchronization, hardware genlock and comprehensive timecode functions are present on a single PCI bus card. Windows NT drivers handle both Intel and Alpha platforms. Multiple StudioCards may be clock locked with single sample accuracy. Other cards include 20-bit digital audio adapters offering 2/2, 2/4 and 4/4 channel record/play capabilities.

Martinsound offers the MultiMAX surround sound multiformat monitor controller. More than a dozen surround formats are easily managed and outputs to 16 loudspeakers are provided, each with separate level trim. A built-in noise generator makes level matching easy. Master volume, mute and variable dim controls function with all systems. Instant selection of main, alternate, near field and mono systems make for quick comparisons and compatibility verification.

Gentner has a new digital telephone hybrid. Replacing the popular DH3, the DH30 works with both analog and digital consoles. Acoustic echo cancellation and DSP technology minimize unwanted noise; additional processing manages abrupt changes in audio levels yielding the best on-air results. All parameters are adjustable through an

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product jackpot

Sun Microsystems unveiled the Sun StorEdge Media Central, a digital media services platform. StorEdge supports ad insertion, multichannel playout and pay-per-view and provides frame accuracy for deterministic analog or digital video/audio streaming.

Circle (408) on Free Info Card

Leitch's LogoMax is an integrated turnkey solution that lets operators put graphics into TV programming by defining, dragging and dropping graphics created with software programs like Photoshop and 3Dstudio.

Circle (370) on Free Info Card

Video Products Group displayed the VPG9000, a 622Mb/s SONET/SDH video multiplexer. The VPG9000 combines multiple video signals onto the same fiber and supports component serial digital video, ITU-R Rec. 721 digital video and composite analog transport.

Circle (419) on Free Info Card

Switchcraft showed its professional punchdown terminal, offering a split-barrel IDC terminal that allows for easy retermination of audio patchbay. The unit accepts 22AWG through 26AWG wire.

Circle (429) on Free Info Card

The new Itelco W123 VHF transmission system serves Band 1, 47- to 88MHz applications and is capable of outputting up to 1500W peak sync. The W123 will serve in vision, sound and digital transmitters.

Circle (363) on Free Info Card

LCD display and convenient programming buttons.

Dolby premiered the first Dolby E encoder and decoder models (see Pick Hits p.74). Incorporating Dolby E coding, multichannel audio is easily moved through existing digital audio systems prior to encoding to Dolby Digital for final delivery. The DP571 encoder and DP572 decoder ease the transition from two- channel to multichannel audio. Up to eight channels of audio plus Dolby metadata travel through a single AES/EBU pair and occupy two digital tracks of recorders or servers.

Benchmark had an eight-channel A/D converter that offered 24-bit conversion at sample rates up to 96kHz. It had a variety of unique features and fits in a single rack unit (for more information, see Pick Hits p.74).

Prime Image featured its Cash audio expander/compressor. This unit allows stations to create an additional 60 seconds for every 10 minutes of programming undetectably, without altering pitch or creating digital artifacts.

Klark Teknik offered the DN3600, a dual-channel programmable graphic equalizer. The DN3600 offers a 30 seletion keys that correspond to each frequency band and notch and sweepable low/high pass filters for frequency level and alter level.

Among the hand-held audio tools on the show floor, two stood out. The first was the Audio Toolbox from Terrasonde. This little wonder provides audio analysis, test functions, hum cancellation and more in a compact package (for more information, see Pick Hits p.74). The second hand-held unit of note is the Minirator MR-1 from Neutrik USA. This little audio generator provides a low distortion sine wave (20-20kHz), square wave, white/pink noise, and more (for more information, see Pick Hits, p.74).

For more information, circle (459) on the Fast Fact Card.

Roy Rising is a systems engineer and production mixer based in the Los Angeles area. He is a contributing editor for BE's sister publication, Video Systems.

by Kenneth Hunold

The transition to digital has affected every area of the television facility. Regardless of what format of audio or video passes through a facility, digital techniques will be used. Digital interfaces are being used throughout broadcast stations. Often they carry signals that were once transported in analog form - baseband audio and video. Analogs that are impressed upon the digital interface still need to be monitored for continuity and quality. Tektronix offers its 601-series digital waveform monitors, and Leader offers its 5100 digital waveform monitor. For HD signals, Leader has the 515x series of waveform monitors (for more information, see Pick Hits p.74) and Tektronix has the WFM 1125. All of these offer some sort of monitoring of the digital interface itself, either SMPTE 259M (standard definition) or SMPTE 292M (high definition). Elaborate serial digital interface (SDI) analysis tools are available from SyntheSys in its Bitalyzer products.

Digital audio monitoring devices with varying amounts of interface analysis are available from Tektronix (WFM 764) and Leader (583x series). These units offer traditional bar graphs and metering as well as vector displays for phase and soundfield monitoring. The Leader 5137 offers a 3-1 surround, 3-2 stereo surround, and 5.1 multichannel surround plus LFE monitor for production and broadcast use.

The so-called digital interconnections used in digital audio and video systems really use analog methods to transmit digital data. These digital interfaces require their own version of interface

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Columbine offered its PSIP Manager, a traffic-driven generator that takes schedule information from CJDS traffic systems and converts it into the proper PSIP tables to create an ATSC-compliant data stream for inclusion in the DTV multiplex.
Circle (343) on Free Info Card

Prisa Networks demonstrated the 64-bit NEtFX Fibre Channel adapters. The adapters support NT servers with a 64-bit bus and Silicon Graphics servers and workstations equipped with 64-bit buses. Single and dual channel adapters are available.
Circle (395) on Free Info Card

Leitch introduced the VR3000 Series video server system, which offers the VR300 video server, FCR disk arrays, RAIDsoft redundancy system, and SpotBase play-to-air software as an integrated solution.
Circle (365) on Free Info Card

V-Bit's RateMux accepts up to 15 MP@ML MPEG-2 input signals through DHEI or DVB-ASI compliant interfaces. The unit then performs real-time CBR and VBR rate conversion and bitstream manipulation processing to the input streams.
Circle (415) on Free Info Card

analysis tools and can also aid in troubleshooting systems with problems (such as interoperability issues).

The AES/EBU digital audio interface also requires its own interface analysis tools. Audio Precision, Tektronix, Prism, Rhode and Schwarz and other manufacturers all showed test and analysis equipment for digital audio interfaces.

The convergence of TV and computers has reached the audio/video monitoring area with the current crop of waveform rasterizers. Beginning with companies such as Hamlet and Magni, these have evolved from displays meant for NTSC video monitors to products that display their information on VGA (or better) displays. VGA displays take advantage of the greater resolution of the monitor as well as the lack of a color subcarrier and its associated filtering. Videotek showed its VTM line of combo audio and video monitors for combining several monitoring functions on a single VGA screen. The VTM 400 extended this functionality to the HD area, incorporating 1080- and 720-line video signal displays and six-channel audio displays (for more information, see Pick Hits p.74).

Analyzing the various elements in the MPEG bitstream is not easy, and significant computer horsepower is needed to store, analyze and monitor these bitstreams.

HDTV broadcasts and SD file servers have made MPEG-2 data compression very popular. The structure of MPEG, DVB, and ATSC datastreams is very complex, and these systems have inspired several tools for datastream structure analysis. Analyzing the various elements in the MPEG bitstream is not easy, and significant computer horsepower is needed to store, analyze and monitor these bitstreams. Sencore, Tektronix, and HP have all developed MPEG analysis solutions for broadcasters. MPEG analyzers are the data broadcasting equivalent to a TV spectrum analyzer. (Note that spectrum analyzers are still required in data broadcasting.) The data packet is the "carrier" of information. If the audio portion of a show suddenly disappears, an MPEG analyzer could check to see if the packet identifier (PID) for that audio service is still part of the bitstream. This is similar to using a spectrum analyzer to see if the audio subcarrier is still present. If the PID (or subcarrier in analog broadcasting) is still there but without data (or modulation), then the problem exists elsewhere. Among the MPEG test equipment at NAB was the Stream Station and Stream Station II from Adherent. The Stream Station II pro-

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product jackpot

Media 100's ShakeVideo is a Windows NT-based high-speed compositing complement to the Finish line of content creation systems. The graphical interface is designed for production with intuitive process tree control and extensible scripting features.

Circle (372) on Free Info Card

Vela Research offered its RapidAccess 2.0, a video delivery system featuring operational flexibility for news, sports or any other type of live programming. The system can simultaneously record and monitor on one channel and play back four other streams.

Circle (428) on Free Info Card

The SRR 2150/16x1 shown by QEC provides a 16x1 broadband switch spanning 950- to 2150MHz. Housed in a one RU enclosure, the switch is controlled locally via momentary pushbuttons and remotely via RS-422 (or optional RS-232).

Circle (396) on Free Info Card

Miranda's Kaleido is a new video display system that allows users to monitor up to 16 analog or digital video signals at the same time on a single computer, plasma or projection screen.

Circle (377) on Free Info Card

ADC Telecommunications introduced its AccessPoint Universal Media Access system, which is designed to transport multimedia over ATM, SDH/SONET and PDH-switched broadband networks. The system integrates MPEG2 compression and ATM format adaptation.

Circle (327) on Free Info Card

vides MPEG-2, DVB and ATSC transport stream parameters. Adherent's Stream View allows up to four transport streams to be monitored. Another device along these same lines is the StreamScope from LG Electronics. StreamScope is a PC-based instrument for recording and analyzing ATSC streams and signals.

A new area of MPEG analysis was displayed at NAB this year. Snell & Wilcox and Tektronix offered so-called automatic MPEG picture quality assessment systems. The S&W PAR (Picture Appraisal Rating) function is part of the MVA MPEG analysis system. This system describes the quality of the video signal (and the related effectiveness of the compression) as a numeric value. This value is related to the S/N of the signal, as any difference between the original signal and its reconstructed form after compression and decompression can be thought of as distortion, or noise. The Tektronix PQA system has two modes: one is an offline measurement that compares the original signal to its compressed result, while the PQR system is a single-ended process that can measure the performance of an operating link. The PQR system analyzes the compressed video and looks for the characteristics of noise, blocking and freeze frames to indicate the effectiveness of the compression process. The MVA system analyzes the MPEG bitstream directly.

Broadcasters have always been familiar with the process of modulation monitoring. AM, FM and TV broadcasters have always used modulation monitors to verify the level and quality of transmissions. With the introduction of 8-VSB modulation, TV broadcasters now have an additional type of modulation that must be checked. 8-VSB modulation analyzers are available from several companies including HP, Tek and Sencore (for more information on the Sencore AT985, see Pick Hits p.74). The process of creating a data modulation system that looks like a 6MHz chunk of noise with very steep skirts is not an easy one, and many of these parameters are new to the broadcast engineer. Constellation diagrams and error vector magnitude are new concepts to many engineers, and the meaning is very important in terms of maximizing the coverage area of a TV station. Many different views and tables of data are available to describe and measure this modulation process.

For those still monitoring NTSC (aren't we all), Modulation Sciences new MSI-320 features a Nyquist SWA filter, synchronous video detector and continuous all channel tuning. Videotek was celebrating their 25th aniversary this year and also showing an NTSC demodulator. The DM-200 high performance demod offers 60dB SNR, 1° differential phase, 1percent differential gain and SAP—in a half-rack package.

With the advent of discrete multichannel audio broadcasts, audio monitoring is being revisited. Manufacturers and audio mixers are struggling with developing methods to monitor effectively six or more channels of audio on a graphic display that is easy to read and comprehend. These attempts vary from "fish finder" displays to different styles of soundfield, lissajous and bar graph displays. DK Audio, Leader, Tektronix, Videotek and others are showing possible displays for multichannel and/or surround sound audio. A simple and compact audio monitoring package is available from Wohler in the form of their ATSC-3, a 2RU device with an ATSC/MPEG-2 digital input (for more information, see Pick Hits, p.74). In addition to audio displays, methods for monitoring the metadata associated with multichannel audio production must be developed. Monitoring the metadata portion of the AC-3 audio signal could be the next growth industry in broadcast and production monitoring for data and audio monitoring.

Thankfully, test equipment isn't going away with the transition to digital broadcasting. Most engineers realize that going digital doesn't eliminate the need for test and measurement equipment. It just means that some tests will be replaced by other, different tests. NAB showed that, indeed, there is still a lot of testing that needs to be done.

For more information, circle (460) on the Fast Fact Card.

Ken Hunold is an audio/video project engineer at the ABC Laboratory, New York

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ADC Telecommunications also unveiled new interface modules for its DV6000 series of switchers. The new modules include ATSC modules for transport of compressed HD and SD signals, a Digital IF encoder/decoder card and a DV6300-S SONET/SDH interface card.
Circle (328) on Free Info Card

Intergraph announced the TDZ 2000 GX1 workstations are now available with the Pentium III Xeon processor at 500MHz. The workstation offers faster performance for NT-based applications and a 20 percent performance increase over older models.
Circle (361) on Free Info Card

DPS introduced the dpsGravity, an online nonlinear editing and compositing workstation. The system includes new DPS hardware and software and compositing software by eyeon Software Inc.
Circle (346) on Free Info Card

Pilot Broadcast showed its Pilot News graphics management and automation software, which allows the graphic artist's 2D or 3D designs to be stored as templates and then employed in a desktop environment by TV journalists and producers for on-air use.
Circle (389) on Free Info Card

Calrec launched its Alpha 100 digital audio production console. The unit offers a maximum configuration of 96 stereo and 48 mono channels, a two-layer design allowing for channel path per fader or dual path arrangement and mix-minus output per channel.
Circle (337) on Free Info Card

By Marvin Born

In the beginning, there was digital (Morse Code is by definition digital; on and off is digital in its purest form). Then came analog with the introduction of voice modulation. That was called radio. Later, with the addition of a few more tubes, more bandwidth and something called a lens, radio with pictures was discovered. It was called television. Since that early beginning, radio with pictures has been analog. For more than 50 years it remained that way, until some sharp engineering type discovered the analog TV signal could be broken into a number of smaller samples and measured. The sample value could be used to reconstruct the radio-with-pictures signal and it looked just like it did before it was sampled. This revolutionary technique was called digital. It could be considered somewhat different than the first digital signal. Also, it was transmitted at faster rates.

Now with more than 50 years of television experience behind us, we have HD radio with pictures. A group of US companies called the Grand Alliance developed the system that became a standard as defined by the Advanced Television Systems committee. This system is divided into three parts: coding/compression, multiplex/transport and transmission. The system conforms to the MPEG-2 standard of video compression at a data rate of 19.4Mb/s and provides for the transmission of audio via the Dolby AC-3 audio compression system, which provides six channels of surround sound audio.

The ATSC system provides for HD and SD television. This 19.4Mb/s of HD or SD data is modulated into a 6MHz TV channel using a modulation system known as trellis-coded 8-VSB. This entire three-part system is known as encoding.

Encoding

By definition, HD encoders must be ATSC compliant for DTV broadcasting. There are several manufacturers who build compliant equipment. One of the earliest was General Instruments. Its current product, DigiCipher II, houses a number of features. One feature is panel overlap processing. This allows the passing of motion vectors from one panel to another, eliminating the artifacts caused by the changing of motion across panel boundaries. Encoders typically have six panels. Inter-panel multiplexing assigns different bit rates to different panels, depending on the complexity of the picture information in that panel. This allows more data to be delivered to the panels with high demand picture elements. The result is fewer artifacts occurring in those high-demand panels. The system also has scene change detection and fade detection. Scene change detection allows the software to detect two adjacent video frames that are either different video scenes such as a camera switch or that the adjacent frames are of the same scene but contain high motion (such as a pan across a football field). At points such as these, the MPEG group of pictures can be closed and a new one started. This results in better bandwidth control and higher video quality. The fade detection is similar to scene change but detects the fade to black that results in a change in bit rate for the black.

Other interesting features of the DigiCipher II include the internal AC-3 stereo processing, rapid switching from SD to HD service and a DS-3 output port. The AC-3 process is somewhat self-explanatory. No external audio encoder is necessary. Up to three stereo pairs can be multiplexed into the transport stream, such as stereo, single mono left and right or any combination from six audio inputs. The system will, of course, pass through pre-compressed/encoded audio such as AC-3/5.1 from an external source. There is also match-

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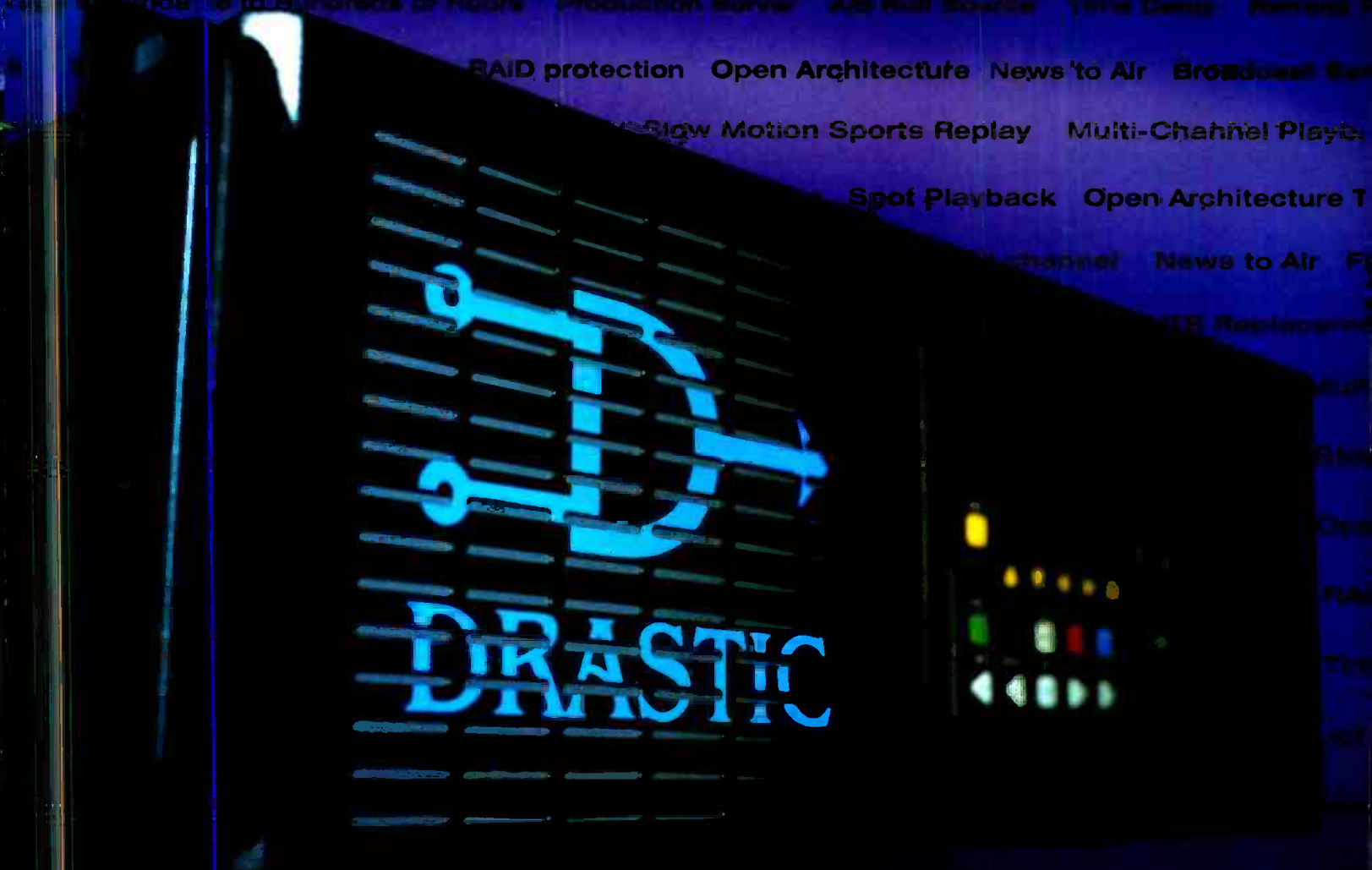

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Avid showed its Unity shared storage and distributed computing products. A combination of advanced media networking and shared central computing technology, the system connects and enables digital media workstations regardless of format or platform.
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Videoframe showcased its Tally Mapper, a general purpose tally mapping and routing unit, allowing one-button, instant remapping. Expander units enable the Mapper to grow to 320x640. A Windows interface allows set up and configuration.
Circle (421) on Free Info Card

Video GainesVille showed the Mighty Mix, a single ME vision mixer that combines all elements of a full-size mixer in one compact unit. It has a DVE option and is suitable for small edit suites or OB vehicles.
Circle (422) on Free Info Card

Solid State Logic showed its Aysis Air digital console, which provides up to 96 fully featured channels, improved surround sound operating modes for 5.1, for AC3 or Dolby Surround with a simultaneous stereo mix, and integrated routing.
Circle (423) on Free Info Card

Canal + debuted its Mediaguard conditional access system, which offers high levels of security to protect revenue sources for digital broadcasters while allowing them flexibility in the way they sell their services.
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Thomson Broadcast was showing its System 5000 Multi-service encoder MSE. The MSE 5000 supports 13 ATSC input formats from 1080P to 480I. Using Thomson's own encoding chipset, the encoder uses six panels and can be used to compress either HD or multiple SD feeds.

NDS introduced a new product, a HD ATSC encoder E5820 that supports 480i@30, 480p@60, 720p@60 and 1080i. It has additional expansion module space for future data support. The E5820 has a special noise reduction system that increases picture quality and reduces bit-rate overhead by not digitizing noise. It supports closed captioning using an RS-232 interface.

COFDM for ENG

Although not HD related, but extremely important to broadcasters, NDS announced its system of COFDM-based digital ENG. With the loss of spectum space in the 2GHz band coming and the reduction in either the number of channels or the bandwidth of the individual channels, something is needed to support the present and future expansion of electronic news gathering operations. COFDM is a multicarrier system of carrier modulation. It reduces or eliminates ghosting and multipath problems, as well as being spectrum efficient. From the field trials it appears to allow much better mobile, meaning moving live shots with no multipath, as well as reduced mast height. The MPEG-2 data rate is 5Mb/s for mobile use, while the clear path mode is up to 28Mb/s. Encoding is 4:2:2 or 4:2:0. Inputs include composite or digital video plus four channels of audio and an RS-232 or RS-422 data channel.

The COFDM modulation consists of 2000 carriers in 6-, 7-, or 8MHz of bandwidth, selectable QPSK, 16QAM or 64QAM carrier modulation. The system provides a 70MHz interface to microwave radio systems. This system was the subject of much discussion. A remaining test should include multiple systems operating at the same time in a breaking news environment where the users are typical ENG operators and direct competitors.

On another front, Scientific-Atlanta showcased its PowerVu Plus MDR (Multiple Decrypting Receiver), which allows programmers to deliver a digital multiplex easily down a cable system to any OpenCable set-top by simultaneously receiving and decrypt up to 16 digital channels.

On the subject of set-top boxes, Philips Semiconductor had their TriMedia processor on hand. This VLIW chip is ideal for multimedia tasks such as MPEG-2 video, DVD, AC-3 audio and real-time 3D graphics. It is very likely that a large number of DTV set-top boxes will be using powerful ICs such as this one.

There were quite a few statistical multiplexing and encoding systems including one from Tadiran Scopus. The system is based on the Codico E1000 series encoders and RTM-3600 multiplexers. Another was Divicom's Divicast which is capable of handling up to 35Mb/s of data with as many as 60 MPEG-2 PIDs (for more information, see Pick Hits, p.74).

Last is a look at Divicom's MV-400 HD encoder. Divicom has a different approach to HD encoding. Rather than dividing the screen into six tiles and using six different SD encoders (one for each tile). Divicom divides the screen in a number of horizontal strips called image slicing. There are 10 slices, each with its own processing engine and encoder. Some of the highlights of the MV-400 include: compact size (1RU); support for 1080i, 720p and 480p; use of motion tracking to reduce artifacts; and integrated Dolby Digital audio support as well as closed caption encoding. There is also an inverse telecine mode that eliminates the 3:2 pull-down, reducing bandwidth on film-based program material.

All manufacturers in the encoding business show a number of different HD encoders including those for DBS and cable as well as those for broadcast. The only disturbing display was one manufacturer that showed the same material in 480, 720 and 1080, so the attendee could see the difference between the formats. All the monitors were the same, of course, but they were Gas Plasma units with 700 line maximum resolution. Many people could not see much difference between 720 and 1080 in that booth. You would think they would know.

For more information, circle (461) on the Fast Fact Card.

Marvin Born is vice president at WBNS-AM/FM/TV in Columbus OH.

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Circle (73) on Free Info Card

By Don Markley

The RF side of television

This was an interesting year at the really big show. There really wasn't anything of the "Oh, my goodness!" variety, but there was a lot of smaller stuff that was in the "interesting development" category.

Transmitters

Harris Corp. showed its new generation DTV transmitter with IOT amplifiers. The Sigma CD-II uses Harris' new exciter. It incorporates a feature they call real-time adaptive correction. That system continuously samples the RF signal at the output of the mask filter. If any distortion occurs, the system detects and corrects the condition automatically, without taking the transmitter off the air.

Harris also showed a new monitoring system that tracks the operation of the corrective system and adds some additional control. This new monitoring system, known as Monitorplus, monitors the RF signal quality, the transport stream integrity and program audio and video signals. This all-purpose system provides the novice (Aren't we all?) DTV operator with the information and control necessary to keep the transmitted signal in top order.

The Comark Division of Thomcast Communications Corp. showed a new version of its DTV transmitters. The Digital Advantage series features an automatic precorrection system that monitors the overall system and automatically corrects for errors. This is an improved version of the series that has been very popular in recent years. Comark announced a cooperative sales alliance with DiviCom, Inc. to supply MPEG-2 encoders. CDS will also provide consulting services to Comark in the areas of system management. Comark also is teaming with NUCOMM to provide STL systems.

LeBlanc announced a new series of low-power translators and transmitters for DTV conversion. The series ranges from 1W to 100W and is designed to replace analog translators. Larcan showed its Landmark series of DTV transmitters. Those transmitters use an IOT amplifier rated at up to 25kW average power per socket. LeBlanc also emphasized its system's capability to manufacture and install towers, antenna systems and transmitters. Several of LeBlanc's projects were listed to demonstrate the complete range of services offered.

Acrodyne showed a new line of transmitters known as the Renaissance Series. The series offers analog transmitters through 240kW and digital transmitters from 1kW through 100kW average power. At the higher power levels, these transmitters use the Diacrode in the power amplifier. Acrodyne has been the largest user of those devices and

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product jackpot

Globecast North America was offering its suite of broadcast services, including master control, studio production, post production, language conversion, worldwide mobile production, SNG, decoder installation, and equipment procurement.

Circle (425) on Free Info Card

Systems Wireless featured the HME Series 800 UHF wireless intercom system, which has been upgraded to include optional ISO and stage-announce capabilities from Beltpac remotes.

Circle (426) on Free Info Card

Wegener launched the Unity 401 receiver for private network distribution. It provides DVB-compliant MPEG-2 digital video operating in either SCPC or MCPC modes from 2.5- to 50MB, as well as audio and data, in one unit.

Circle (427) on Free Info Card

Canal+ also showed its interactive digital broadcast system, Mediahighway. The system is adaptable to cable, satellite and terrestrial environments and acts as a virtual machine, running independently from hardware platforms and operating systems.

Circle (434) on Free Info Card

CPI Eimac introduced additions to its K2 Klystrode family of IOTs. The new models are designed for either analog or digital transmission, and are conservatively rated for 32 kW (K230W) and 43 kW (K240W) when operated in visual service.

Circle (435) on Free Info Card

features them in their ACT transmitter. The ACT transmitter operates with NTSC and DTV carriers on adjacent channels. Acrodyne also showed its solid state transmitters for up to 4kW digital service and tetrode transmitters for up to 25kW analog and 12kW digital systems.

Continental Electronics Corp. showed the newest version of its solid state and IOT transmitters. Continental has acquired TELEFUNKEN Sendertechnik and has developed LD-MOS solid state TV transmitters for up to 40kW average power. It also offers a line of IOT devices for up to 240kW analog operation.

EEV showcased the 9000 series of IOTs, as series of plug-in analog and digital IOTs rated at 80kW and 130kW at peak. The IOTs offers output powers in a compact package and provide faster tube replacements than standard IOTs.

Antennas and feedline

Andrew displayed a new line of receive-only earth station antennas. The new Valustar line is designed for broadcast distribution needs and is constructed to operate in both varied and adverse environments. Andrew also showed both of its slot and panel antennas for DTV and analog use as well as a new model of automatic dehydrator. A new type of rigid transmission line was shown with broadband capabilities for multiple station use. The line uses Andrew's bellows expansion section that now has varied lengths to remove the taboo channels for given lengths.

Myat Inc. also demonstrated a broadband coaxial line for multiple station use. A very interesting development was its new elliptical waveguide for UHF television. Known as Spectraguide, this product has a drag coefficient of 1.6 compared to 3.9 for standard rectangular waveguide. Four sizes cover the entire UHF band. Due to the manner in which the fields propagate in elliptical waveguide, there is no need for pins in the waveguide to control moding. The only tuning required is at the input and output transistions as is done for circular waveguides. Signal loss is less than for rectangular waveguide and only slightly higher than for pure circular waveguide.

RFS displayed its panel antenna systems as well as its flexible and rigid transmission lines. A popular item was the company's rapid release U link systems. Designed to replace the standard RF patch panels, U links are available in up to 6 1/8". The big feature is a simple and quick release mechanism that eliminates hose clamps. The smaller versions mount in a 19" rack section. As for other panels, the RFS antennas offer wideband capability for multiple station operation.

Shiveley Laboratories was also showing panel antennas as well as the UHF batwing type antenna introduced last year. Both the panels and batwing antennas are designed for multiple-station wideband applications.

As indicated by the number of wideband antennas shown, combined station operations are becoming very popular for DTV operation. A modified version of such a panel antenna was the centerpiece of the Dielectric Communications booth. Dielectric showed a five-panel-per-layer antenna known as the TUP-05. Several of these can be stacked to obtain the desired gain. The five-around configuration results in a larger structure then four around, offering more room for the supporting structure. That is a particular advantage in areas of high wind loading where the added strength is needed. The five-around configuration also assists in improving pattern circularity. These antennas provide circularity of ±1dB over most of the UHF band.

ADC Broadcast (formerly ITS) displayed an expanded line of their Visionary series IOT transmitters including a new model for DTV use. As applies to most manufacturers, these transmitters are available for use as either NTSC or DTV with different exciters. The analog transmitters also convert to DTV operation without changes to the amplifiers. These transmitters use IOT amplifiers driven by linear feed-forward IPAs for power outputs from 20kW peak power to 280kW. ADC was showing exciters for retrofit applications. These units provide DTV capability for existing analog transmitters from most manufacturers. Solid state transmitters up to 10kW were also on display for analog or digital applications.

What has appeared to be a long-standing problem has been addressed by Micro Communications Inc. Many sta-

tions have been assigned a DTV channel that is one channel above their analog assignment. Such operation has raised a significant amount of concern regarding its affect upon the analog station. In particular, the concern has been that the aural part of the analog signal would be significantly impacted. MCI has developed a combiner using dual aural cavities that appear to resolve the problem. The entire system is temperature compensated for stability and shows good bandpass and isolation characteristics. The measurements are available from MCI by requesting Report #90462A.

Microwave systems for DTV were shown at several booths including Harris, Itelco and California Microwave. California Microwave, using Adaptive Broadband (formerly MRC radio) platforms, demonstrated its "TwinStream" radios, which allow the transmission of both analog and DTV signals on the same channel. That same concept is available from Harris and Itelco under different names. California Microwave also displayed a new series of portable radios for news gathering. The "CodeRunner" series supports digital modulation in various formats including COFDM and MPEG (See Pick Hits p.74). One very small ENG microwave transmitter was on display at Global Microwave. This unit operates at 5.8GHz and was smaller than the 9V battery used to power it (See Pick Hits p.74).

As indicated by the number of wideband antennas shown, combined station operations are becoming very popular for DTV operation.

Artel Video Systems was showing fiber based HDTV STLs as well as their DL8000, a new multichannel analog fiber optic transmission system.

Broadcast Microwave Services had their line of microwave systems (1.4- to 15GHz) on display, including analog and digital models for air-to ground links and point-to-point data and video links.

NSI displayed the Superquad central receive antenna system and the Silhouette transmit antenna. Both systems are designed to overcome frequency congestion by operating at 2/2.5 plus 6.5/7 plus 12/13GHz.

For those with satellite uplinks have a new way to transport signals, Ortel was showing their L-band and 70MHz HD fiber optic links, which are useful alternatives to coaxial cables for broadcast uplinks.

Holaday Industries showcased the HI-4455 and HI-4457 field probes, two RF test probes that provide electric field detection and measurement between 200kHz ad 40GHz. The HI4457 also provides magnetic field detection between 10MHz and 1GHz. Holaday also introduced the HI-3804, an EMF detection and measurement system for 10-42MHz ISM frequency bands. The HI-3804 features on-board data logging and review, squared and power density units display and electric and magnetic field strength measurements.

Along those same lines, Wavetek, Wandel and Golterman had its WG DTS-400P MPEG-2/DVB digital broadcast monitor, which offers remote troubleshooting and real-time continuous monitoring of MPEG-2/DVB transport streams up to 60Mb/s.

All of this DTV RF equipment has to lead somewhere. Ultimately, it will end up on viewer's receivers. Today 16:9 sets are somewhat pricey and somewhat scarce. Numerous vendors were showing 16:9 monitors at the show, one of which was Princeton. Their 30V CRT HDTV monitor includes a fine pitch 16:9 high resolution Invar shadow mask, high light output and a built-in line doubler. ■

For more information, circle (462) on the Fast Fact Card.

Don Markley is president of D.L. Markley and Associates, Peoria, IL.

Applied Technology

Harris/Hewlett-Packard build DTV test vehicle

BY ELIZABETH AGUILAR AND JERRY PLEMMONS

The U.S. broadcast television industry is organizing its first digital HD transmitting stations, under advisement by the FCC that it do so or risk loss of spectrum.

On a more positive note, the FCC agreed that no existing station should lose coverage – and the revenue potential that accompanies it – in the transition to HD. Accordingly, each station can now determine its present NTSC coverage pattern and establish a digital transmission pattern that duplicates it.

The obvious implication of signal coverage uncertainty is that field strength measurements of both NTSC and ATSC signals are required at selected locations throughout the coverage area.

The need for reliable coverage data requires a vehicle appropriately equipped to record signal strength in multiple locations. Harris Broadcast Systems developed such a vehicle and is currently testing it under a variety of circumstances.

A Harris operator sits comfortably inside the van collecting data during the field test. The keyboard provides easy input of information to the computer program controlling the HP 89441V vector signal analyzer.

Developing the field test vehicle

Harris outfitted a conventional Ford 350 van with a nine-meter, pneumatic-lift mast and precision yagi antenna, including a CCTV camera to serve as an electronic periscope to enable operators to avoid local obstructions while aiming the antenna back at the transmitter.

Inside the van is a full complement of instrumentation, including standard and DTV monitors for TASO signal-quality evaluation, a Harris ARX-H200 receiver, a PC, a weather station, a GPS for precision location logging, a spectrum analyzer, stereo system and calibration equipment (See Figure 1).

The centerpiece of the field test vehicle is the HP 89441V vector signal analyzer. This analyzer offers sufficient input sensitivity to monitor both the output at the transmitter – Harris is building it into their HD transmitter monitoring system – and the signal strength at the outer limits of coverage, where the cliff effect occurs. The particular advantage of such flexibility is consistency of data. Using the same instrument in both capacities ensures that no errors will creep in as a result of anomalies associated with differing instruments. As the fledgling DTV market expands and the inevitable spectral interference issues arise, the advantages of having both measurement flexibility and recognized standard instrumentation become even more apparent.

Digital signal strength is measured differently from the analog NTSC signal. Because it employs a digital modulation format, HD television looks like noise, and measuring it requires integrating the total power present over the bandwidth of interest. A conventional spectrum analyzer can calculate this data by applying correction factors for the resolution bandwidth, noise bandwidth and detectors. However, the HP 89441V performs the measurement automatically. It looks at the channel and, when the band power markers are set on 6MHz bandwidth, it automatically calculates the signal power inside the band. The analyzer can also automatically apply the FCC weighting mask to the measured signals. The latter information is, of course, crucial to neighboring channels. With the disappearance of taboo channels, the precision of HD signal propagation becomes critical to the operation of the broadcast network.

The HP 89441V can replace multiple instruments, including a spectrum analyzer, power meter and frequency counter. The instrument is appropriate for both QAM and VSB measurements, particularly the new digital modulation formats such as 8VSB and 64/256 QAM. A downloadable program developed during early ATSC field testing is available from Hewlett-Packard. The program allows technicians to perform transmitter characterization tests of NTSC and 8VSB ATSC broadcast formats with one-button operations.

Computer control table

Within the van, however, the PC acts as a mission control processor. Harris Navigator software simplifies the signal measurement process by automating many of the measurements. The truck incorporates a LAN that controls the HP 89441V vector signal analyzer, the HP 8591E spectrum analyzer used for the NTSC signal, the GPS, the antenna position system, the NTSC receiver and the weather reporting equipment. After performing a calibration process and manually inputting basic data about the van location and the channel being measured, the technician initiates the measurement procedure. Because the HP 89441V is computer-controllable, a computer can direct it through the process, read all the data and print out the necessary reports on an inkjet printer. It all happens very quickly and smoothly. Consistent, comparable data is recorded for each site the van visits.

In addition to numerical data, the HP 89441V provides a graphical output. This provides a record of the signal bandwidth and any impairments. The eye pattern is available as a printout, and its digital data integrity can be observed. The HP 89441V also displays the constellation of 8VSB voltage levels, which provides an indication of problems with the transmitter. For example, while the transmitted signal would customarily have a flat top, any problems will prompt the instrument to display the spectrum with a tilt in it. (See Figure 2.)

Another FCC specification requires that the measuring antenna be the same height as the average home antenna, hence the nine meter mast. When recording the strength of the signal, the agency requires the operator to drive the vehicle 100 feet with the antenna pointed at the transmitter.

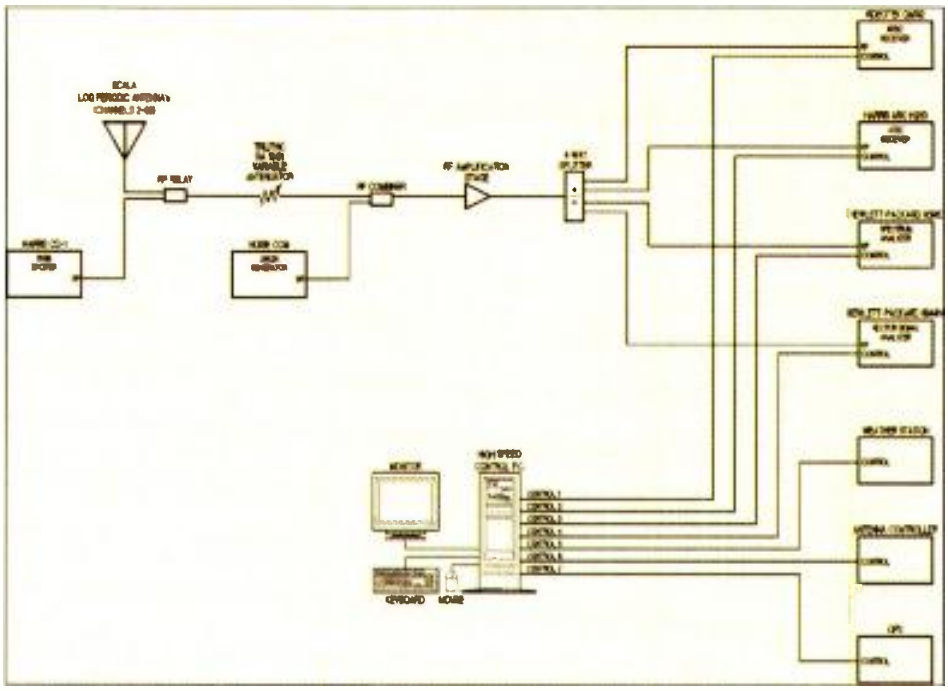


Figure 1. The versatile instrumentation allows a variety of tests for TASO signal-quality to be quickly performed.

Versatility and flexibility

Prior to the advent of the HP 89441V, signal strength measurement was taken on a strip chart recorder. This displayed the maximum and minimum signals in the 100-foot window, but the measurement was relatively primitive. The HP 89441V allows the analyzer to output that information to the PC and manipulate data as necessary to display peaks and nulls with great precision and then print a plot. An operator can store the plot for future reference, either as a file or in a binder. Should the terrain somehow change – perhaps with the construction of a new building – a company can bring the van back, take new measurements and compare data for any effects the change may have on coverage in the immediate area.

Field strength measurements reveal antenna anomalies and problems. If zoning pre-empts antenna construction, the broadcaster may opt to side mount an antenna on an existing tower. If the steel of the tower affects the signal pattern, however, the broadcaster can rethink the antenna position or consider augmenting the existing antenna with a second one aimed at the current null area. That scenario would require additional coverage measurements.

The HP 89441V provides capabilities that include an extension beyond signal strength measurements to indicate exactly what a signal looks like and permit a thorough analysis of signal characteristics.

As the drive for a national database of signal patterns moves forward, the need for consistency will be at its greatest. The HP 89441V is evidence that the project is off to a good beginning.

For more information, circle (252) on the Free Info Card

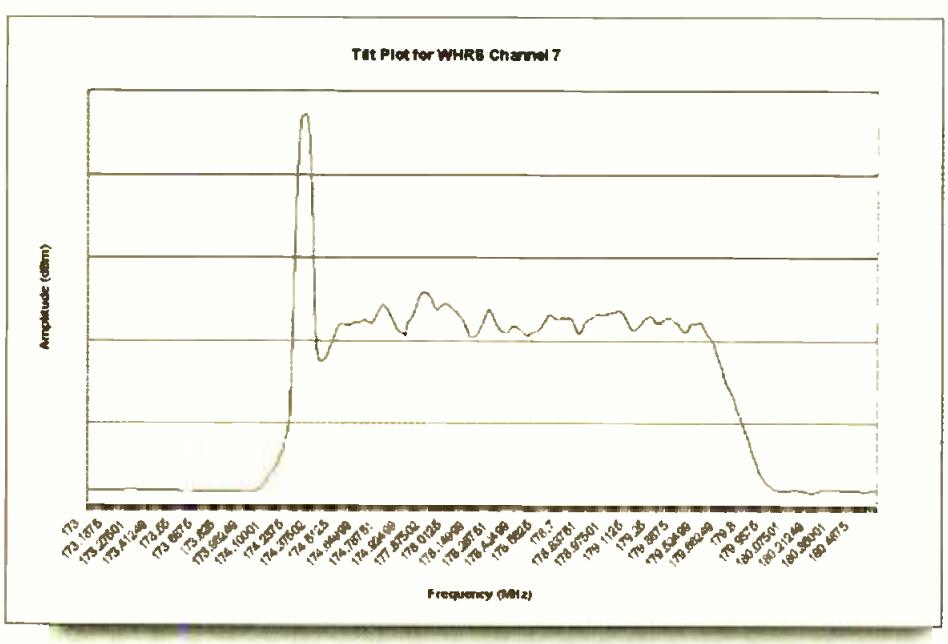


Figure 2. Tilt plot of the on-board 8VSB exciter graphed from the HP 89441V data.

Elizabeth Aguilar provides technical support for the HP 89400 series vector signal analyzers in Hewlett-Packard's product marketing. Jerry Plemmons is engineering manager at Harris Broadcast Systems.

Applied Technology

Panasonic's AJ-UFC1800 Universal Format Converter

BY DAVID WISWELL

The AJ-UFC1800 was created for spatial conversion of any ATSC image format input to any ATSC DTV image format video output. Film mode is provided to facilitate 3:2 or 2:2 pull-down for video originated at 24 or 30 frames per second whether from film or video cameras. While performing conversions, user features for adjustment of functions such as color space, aspect ratio and audio and video timing are available from a simple operator interface panel. New image formats may be programmed into the converter through a computer interface. The UFC1800 is designed to be a flexible system for the conversion to ATSC television.

Panasonic AJ-UFC1800 Universal Format Converter.

Transition from the NTSC/PAL television era to the new era of ATSC television requires that systems design concepts and production practices be modified to accept video images in multiple image formats. The ATSC system includes at least 18 different imaging structures with four basic image format active picture areas, 1920 pixels by 1080 lines, 1280 pixels by 720 lines, 720 pixels by 480 lines, and 640 pixels by 480 lines. The ATSC standard also allows progressive or interlace scanning of the image formats as shown in Figure 1.

When the FCC incorporated ATSC-DTV broadcasting into its rules, it made no mandate for compliance with Table 3 of the ATSC standard. Broadcasters and others creating or delivering ATSC television may select any of the Table 3 formats for video production or delivery. Since Table 3 is a voluntary standard by FCC rules, the possibility exists that new image formats may be adopted. This variability of the image format situation makes for a seemingly confusing environment for broadcasters, as well as production and post-production facilities. It is not likely that facilities will spend the large amount of money required to accumulate enough equipment to be able to be fully functional in multiple image formats. The ability to convert images produced in one format to another image format is key to developing a manageable technical system while providing clients with the image formats they require.

The insertion or deletion of 3:2 or 2:2 pull-down is key to 24-frame video production. The AJ-UFC1800 converter is capable of insertion or deletion of pull-down and can use timecode or A-frame sync reference to maintain correct pull-down sequence. Metadata will also be available for control of image and pan and scan parameters.

Control of the pulldown sequence is critical to proper operation of MPEG encoders used by broadcasters for DTV transmission. Transmitting at 24f and allowing the viewer's DTV receiver or set-top box to re-insert the sequence can save 20 percent of the digital bandwidth required for video in the transport stream. This 20 percent savings can be used to reduce the compression ratio of the transmitted signal or multiplexing alternative data or program material into the transport stream.

The converter is designed in two parts: a hardware system with a new resizing engine being the central component, and a software system with the various control, translation, subsystem and hardware interfaces. (See Figure 2.)

Panasonic developed a new programmable resizing engine as an ASIC for use in the converter. The resizing engine is the heart of the "Expert System" built into the format converter control system and assures optimal performance of a complex set of possibilities. More than 1000 filter selections are available to the system for conversion picture optimization. Optimum settings for enhancement and filtering can only be achieved by considering the format of both the input and output images. The control program optimizes the enhancement filter settings for the I/O side of the conversion engine but can also be user controlled.

The PC 104-control module controls the audio and video paths through the converter. Audio timing can be adjusted to match video timing. The operating software program provides control of video filtering, enhancement, pan and scan, and zoom. For aspect ratio conversions, a variety of side panel and cut options are provided with background color control. An internal test generator feature is provided for system testing.

Video from the input control module is clocked in at the input data rate determined by the system timing module. The data is resampled according to the input format, output format, and resizing parameters set with the front panel controls. Color matrix control for the conversion is applied using preprogrammed parameters or user-controlled color correction adjustments. Filtering and single dimension-

American ATSC Standard

FCC/ATSC Voluntary Formats

	Scanning Lines	Horizontal Pixels	Aspect Ratio Pixel Shape	Picture Rate	Horizontal Frequency
HD	1125 Total 1080 Active	1920 Active	16:9 Square	60I, 30P, 24P	33.75 kHz (60I)
HD	750 Total 720 Active	1280 Active	16:9 Square	60P, 30P, 24P	45 kHz (60P)
SD	525 Total 480 Active	704 Active	16:9, 4:3	60I, 60P, 30P, 24P	31.5 kHz (60P)
SD	525 Total 480 Active	640 Active	4:3 Square	60I, 60P, 30P, 24P	15.75 kHz (60I)

Figure 1. Of the 18 ATSC image formats, six are HD and 12 are standard definition.

al enhancement takes place in the resizing engine. Two-dimensional enhancement is added later in the output control module.

The output control module receives video data from the resizing engine and performs the 2D enhancement according to user control settings. The input and output control modules receive necessary timing from the control module, which is controlled by the PC 104 module. The PC module receives values and adjustment information from the control panel and determines which subsystems need to be updated. The PC 104 module creates download files for subsystems within the UFC1800 to implement the user control settings. The entire control process is designed to take place in less than one video frame, so real-time adjustments are possible.

The operating software is divided into two groups — controls and subsystem parameters. Controls are user variables with easy-to-understand values, such as Zoom=1.2 or Pan=0.75. Subsystem parameters are variables required by the subsystem hardware. Subsystem values are not easily recognized such as "in_hstart_phase=63." Translation software takes data from the control module and creates the corresponding subsystem parameters.

The format converter software system is intended to provide maximum control. The software system allows users to reprogram many parameters for conversions between a wide variety of image formats. The operating system software is preprogrammed for conversions between any ATSC image format controlled from the front panel user interface.

Front panel control software responds to user input from the front panel control and manages the display panel. This module provides the user input control data to the control system hardware module for implementation by appropriate subsystem.

Video format files provide standard image data to the control module. Each video format recognized by the UFC1800 has a fixed set of properties, these values are held in the system memory. Additional new input and output image formats may be added by entering the new video format file using the converter's nine-pin RS232 computer interface port.

The primary interface between the user and the control and subsystems is the front panel menu system and display, careful design was required to assure simple, intuitive operation. The menu screen and function keys are used in combination with the keypad and a continuously variable adjust control to select functions and make variable adjustments. In addition to the "adjust" control knob, the front panel consists of a 4x40 character display, five function buttons, an exit button and twelve menu buttons. ■

For more information about Panasonic's AJ-UFC1800 Universal Format Converter, circle (250) on the Free Info Card.

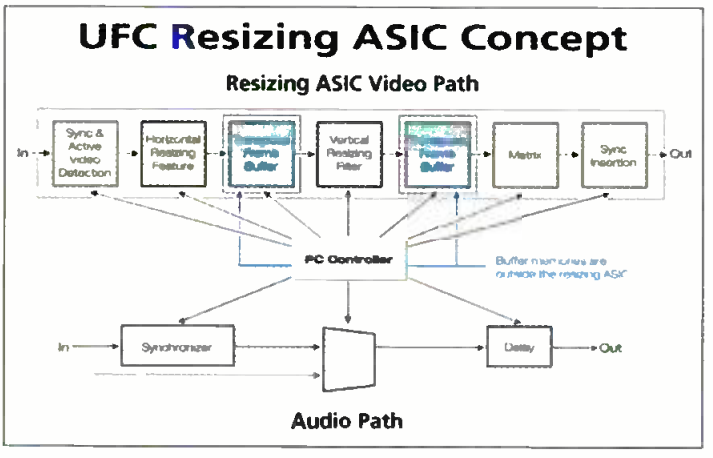


Figure 2. The UFC Resizing ASIC Design Concept places the PC-104 controller between the audio and video paths. The control process is designed to take place in less than a single video frame, making real-time adjustments possible.

Dave Wiswell is group manager of high-definition products for Panasonic.

Field Report

Solid State Logic Aysis Air

BY JERRY AGRESTI

NBC's WRC-TV in Washington, D.C. has a history of being first. Dedicated in 1955 by Vice President Richard Nixon, and site of the Nixon/Kennedy debates, it was the first NBC station to have a color infrastructure, the first station in Washington to broadcast stereo, and the first commercial station in Washington to go on air with digital television. When the process of re-equipping the station is completed later this year, WRC will be one of the first stations in the Washington area to boast a full digital infrastructure, including an all-digital Aysis Air audio console from Solid State Logic.

Dave Hansen (left), technical operations manager for SSL, and Jerry Agresti, Director of Engineering for WRC, with the Aysis Air, part of WRC's move to a fully digital infrastructure.

The decision to replace WRC's analog system was influenced heavily by the upgrade to serial digital by NBC's network news bureau, which is housed in the same building. This rebuild was carried out by systems integration company Communications Engineering Inc (CEI), Newington, VA. CEI regards Washington as home territory, and because of its familiarity with the facility's infrastructure and staff, was a natural fit for the project.

Performance at a glance

- discrete control surface
- 96 fully-featured channels
- controlled snapshot reset
- integrated routing
- inbuilt redundancy

In choosing a console for a project of this scope, there are many factors to consider, including familiarity of operation, the ability to handle 5.1 and Dolby AC-3 surround sound, the automated routing and recall of setups which digital provides, the manufacturer's attitude towards support and development and, of course, cost. In addition, the engineering staff figured the cost of the A/D D/A converters that would be necessary if an analog board was selected. The Aysis Air was competitive with that figure.

WRC's staff also valued the Aysis Air's excellent specs and strong feature sets including the automation, the elaborate routing system and the deck, which has a very low operating temperature. Staff found the board easy to use, and SSL agreed to work with WRC on some features which didn't exist in the original configuration. SSL has subsequently delivered those features.

With up to 96 fully featured channels of audio, Aysis Air may be specified with up to 48 channel faders in bays of eight, each bay controlling one or two layers of either mono or stereo channels. An additional 12 faders in the center section provide eight group masters and four stereo subgroups, enabling full 5.1 operation with a simultaneous independent stereo output mix. The WRC console has 32 channel faders, controlling 16 mono and 16 stereo channels per level.

Aysis Air follows SSL's digital practice of having a locally powered digital control surface connected to a remotely-sited digital processor. This interconnection comprises three multicore cables of 16m or 48m length, plus analog audio lines for monitoring, local PFL etc. SSL's proprietary HiWay link supports up to 95 mono audio channels bidirectionally, via standard coaxial cable for distances of up to 150m. The HiWay link is used to interconnect the console processor and remote I/O (RIO) units, which may be digital (AES/EBU I/O), analog line level or analog mic amp units. WRC's console has 56 analog I/Os, 120 digital I/Os (60 AES/EBU pairs) and 48 mic amps and is fitted with SSL's Hub Router option to provide the necessary additional number of HiWay ports.

The Aysis Air control room has two studios working to it, each of which has two remote mic amp ADCs providing a total of 24 mic amps for each studio. These are connected to the Hub Router and processor rack in the ma-

chine room via coaxial HiWay links and Ethernet links, the latter providing the control for the gain, 20dB pad, impedance selection, high pass filter(off/115Hz/60Hz), adaptive signal limiter and phantom power switching for each mic amp, all of which functions are controlled from the associated console channel. Although full analog patchbay facilities are provided, no patching is necessary to select microphones or line level sources or destinations, as all audio signal paths in the station are identified uniquely and are selected as required by the SSL Hub Router.

The Hub Router, unique to SSL, is a digital routing system that may be configured to provide over 2000 I/Os, and may thus be used to share resources between several studios and several consoles. These resources may be microphone inputs, as noted above, and also analog and digital line I/Os. In the case of WRC's installation, the Hub Router is interfaced with feeds from the Philips station router, and the Aysis Air's snapshot recall is utilized to configure the I/Os required for each different show. These configurations are done during setup, which is the only time that the console's pen and tablet control is used, as the setups are recalled by keyswitches programmed with macros. The result is similar to but more flexible than normaling on an analog patchbay. Any part of the recalled setup may be changed. This is done simply by using individual panel switches instead of over-patching and the normaling changes with every setup.

Although Aysis Air can provide simultaneous 5.1 surround and stereo outputs, the news programming of WRC uses only stereo. The console output, digital AES/EBU, is fed to the station router for selection to outgoing feeds as required. ■

For more information on SSL's Aysis Air audio console, circle (253) on the Free Info Card.

Jerry Agresti is Director of Engineering for WRC in Washington, D.C.

Field Report

WFAA/KHOU sign on with commercial digital two-channel STLs

BY WAYNE KUBE

WFAA-TV in Dallas and KHOU-TV in Houston initiated DTV services with commercial two-channel STLs. Both stations use Adaptive Broadband DAR45 7GHz digital microwave systems to transport compressed digital video signals from studios to DTV transmitter, as well as to existing analog TV transmitters.

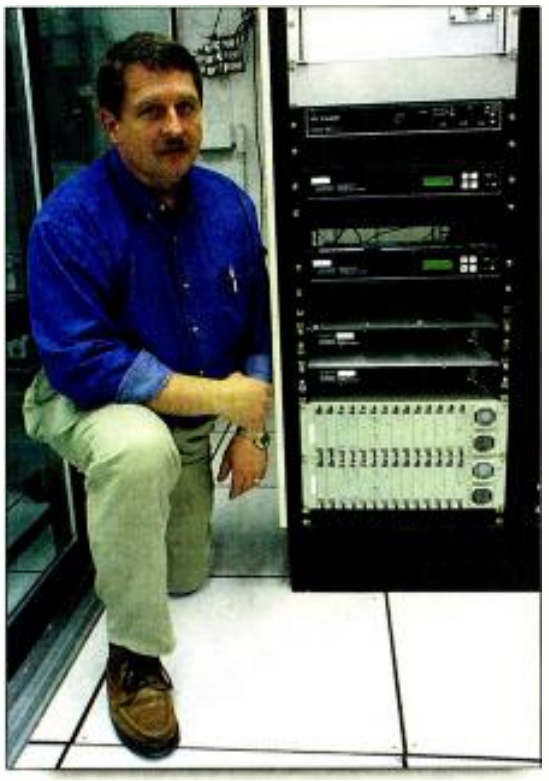
A.H. Belo Corp., WFAA's group owner, requested that Adaptive Broadband provide a complete digital video transport solution, including microwave radios, MPEG-2 video codecs, multiplexers, protection equipment and antennas. In response, the company worked closely with the engineering staff of WFAA and KHOU to provide a thoroughly designed, integrated and tested solution for our digital STL.

The two-channel digital STLs are protected DS3 STL configurations that use hot standby switching at the studio and modem diversity switching at the receiver. The DS3 rate is used for the integration of the ATSC transport stream (19.39Mb/s) with an MPEG-2 compressed D1 formatted video signal and a T1 data signal.

At the studio, a 270Mb/s D1 video signal is routed to the input of both MPEG-2 encoder frames at the serial input connector. The D1 signal is synchronized and compressed (factory set at 20Mb/s) internal to the encoder frame, where it is then digitally formatted and multiplexed with the incoming analog audio signal which is also digitized according to user selection in an uncompressed PCM format or compressed to MPEG-2, Layer II (MUSICAM).

The DS3 interface module takes in the composite digital bitstream and the ATSC stream and supplies the multiplexed data with the required timing, frame format and amplitude level to meet the G.703 requirement for outputting from the TX connector in the back of the encoding frame.

This DS3 output signal (44.736Mb/s) from both encoders is then fed to both QM4 modems thus creating two parallel information paths. The QM4 modems process the data by generating B3ZS line coding and add Reed-Solomon error correction bits into the data payload. The data payload is then separated and bit encoded for integration onto the I (in phase) channel and Q (quadrature phase) channel of the I/Q modulator board (16QAM). The I/Q board sums the two channels together to encode the data onto a 70MHz oscillator with phase lock loop circuitry to create a 70MHz modulated pedestal at a level of -10dBm with a data rate of 44.736Mb/s.



Wayne Kube (pictured) employed the Adaptive Broadband STL solution when WFAA-TV in Dallas transitioned to DTV.

These two 70MHz IF signals (from both modems) are then fed to the two DAR transmitters. The modulated 70MHz signal is then processed in the transmitter IF module. A phase-stable YIG oscillator is used to generate the LO signal. The LO and IF signals are then mixed together with the upconverter module and the output drives a power amplifier to produce a .5W output.

A wiring harness is used to connect the summary alarm outputs from the QM4 modems, DAR transmitter and encoder frames to the hot-standby shelf. If a failure occurs, an open circuit condition from either the modem, radio or encoder frame will drive the hot-standby RF waveguide switch to pass the protected output.

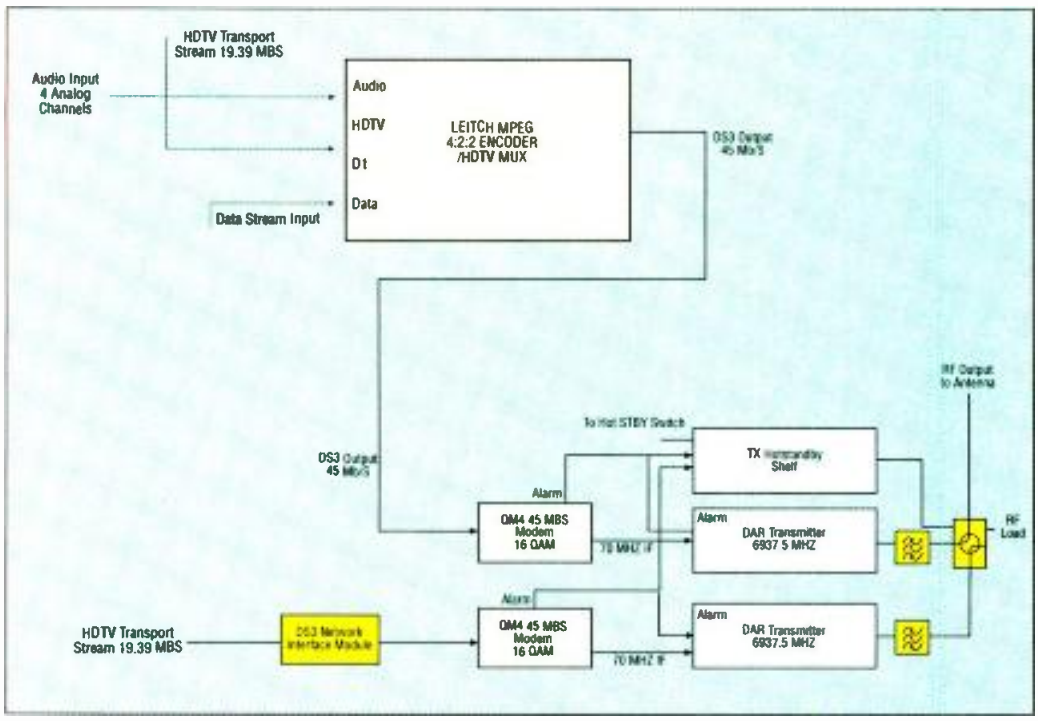
At the transmitter site, the two incoming received signals (diversity reception) are fed down through the applicable waveguide filters and isolators where the signals are received by two DAR single-downconversion receivers. In the DAR, the low-noise downconverter module converts the incoming RF signal to 70MHz by using a low side LO signal generated by the phase-stable YIG oscillator module.

The 70MHz signal is then equalized and amplified by the IF equalizer module and the IF AGC module. These two modules filter and set the IF output level to a constant -5dBm output. The two 70MHz signals (from both receivers) feed the input to the QM4 demodulators.

The QM4s are configured for diversity switching with a data cross connection cable that connects the two modems together. The internal diversity switch demodulates the two 70MHz IF

streams, synchronizes them together and optimally switches between them to produce seamless switching without inducing errors. The system will track propagation delay changes and provide a data output from the receiver with the highest probability of being errorless and feed that signal to both modems for output. This allows the user to take one system off line and still have data continuity.

The common DS3 output from both QM4 modems feed the two decoder shelves in parallel and are supplied to the RX port on the back of the DS3 interface module. The decoder strips off the DS3 framing pattern and separates the data streams (i.e. MPEG, ATSC, T1). The individual streams are decoded and routed to the appropriate output interface module where the output is then supplied the necessary analog waveforms or data interface.



At WFAA's studio, the HD and data signals are multiplexed, forming the DS3 encoded (45Mb/s) signal. The encoded signal is fed to two QM4 modems and then to a pair of DAR transmitters, then monitored and, if necessary, the hot standby transmitter is switched on. Any failure causes the backup DAR transmitter to be automatically switched online.

Each composite video and analog audio channel feeds one channel of a hot standby shelf. A contact closure on the decoder shelf is used to indicate failure (air temp, rail voltages, and fan failure), an open circuit condition triggers the common output out of the shelf. On the second channel of the hot standby shelf, the two ATSC outputs from the decoder are connected. The switch will select the same channel output as the composite video channel.

An adaptive equalizer card is included in bottom board inside the chassis, the QM4 demodulator. The card is used to compensate for multipath from signal dispersion. If two signals of the same frequency unequal in phase or equal in phase are received at the same point, they will cause intersymbol interference inside the modem, which produces a high bit error rate (BER). The two signals can add or subtract in phase, creating IF notches. The card corrects for any IF notches or skew in the passband to maintain good BER. Included in the test data, there are M-curve measurements that reflect the modem's ability to compensate for these notch depths.

For more information on Adaptive Broadband's digital, two-channel STLs, circle (251) on the Free Info Card.

Wayne Kube is engineering technical manager WFAA-TV & DT, Dallas, TX.

Shopping for DAWs

BY YASMIN HASHMI

The benefits of random access playback and nondestructive editing have been demonstrated for many years, but, for the novice, the choice of systems currently available can prove bewildering.

There are now tapeless systems for almost every professional audio application, from PCMCIA-based portables for location recording and simple editing, to post production editing with surround sound mixing for video, television, film and DVD (Digital Versatile Disc). There are simple cart replacement products for broadcast or theater, and live-assist and full automation systems for radio. There are multitrack tape replacement units, and systems for CD premastering and/or delivering audio content via existing and new media, such as digital radio broadcasting, high-density CD and the Internet.

What's best?

With so many systems available, finding the best system to suit a particular application and budget can be a daunting task. For some, the price of a system will be the most important factor, and there are now affordable packages available which open the market to the masses. Indeed, taking advantage of standard hardware provides the user with added flexibility, potentially allowing other software to be used on the same platform.

Calculating a realistic cost however, may not be so straightforward, given the number of variables involved in configuring a system for a particular application. For those who have strict budget constraints, the software-only package that can be used with an existing computer platform for example, may be the only solution, but most stipulate minimum requirements for CPU power, storage performance and capacity.

DIY packages

Packages that rely solely or partially on the host processor will usually require the latest models, and whichever platform is used, the number of continuous streams or channels supported, as well as the overall performance of the system, will be highly dependent on the specifications of the hardware you use, including the disk drive(s). The final cost may therefore involve not only the software package, but necessary upgrades to the host and storage as well.

The user must also consider what type of synchronization capabilities and I/O will be required. Will the system be used as a stand-alone device and if so, will its integrated mixing capabilities suffice or will there still be a need to use it with certain outboard gear? Even if a personal computer has in-built audio capabilities, if professional I/O and sync interfaces are required, appropriate cards must also be sourced.

While the computer industry is clearly driving the overall direction of the random access market, it cannot be expected to completely address the particular requirements of the audio professional. There is still a need for hardware geared specifically to handling and processing audio, which explains why there are so many proprietary processing engines available.

These take the load off the host CPU and are usually provided as plug-in cards accompanied by proprietary software applications, but some also come in the form of custom rackmounts with all required processing, I/O, storage and sync interfaces.

Turnkey solutions

For those users who do not have the confidence or desire to upgrade their computers themselves, many manufacturers also offer their card and/or software packages in the form of a turnkey system, complete with the required platform and storage. Ultimately for many users, especially those seeking guaranteed performance, the proprietary turnkey system is the ideal solution. Manufacturers obviously agree, as the number of such systems is on the increase, ranging from low-cost, compact self-contained desktop units to high-end systems with integrated automated mixing and, in some cases, nonlinear video.

Seeing is believing

In fact even if all technical and budgetary requirements are met, 'the best' system will still vary from person to person. It may be determined by factors such as personal preference of operating style — some people are perfectly content with mouse-driven operation, whereas others may eventually prefer more tactile control. It may depend on after-sales commitments and confidence in continued technical support.

Not everyone has the time to find out about all the systems on the market or to review them all, but it is worth seeing as many as possible. Relying solely on word of mouth may mean missing out on a system that is even more suitable or a better value. In reviewing tapeless systems, it will soon become apparent that each has its own way of presenting information, and on first appearances this may be a key issue. Take note of how easy it is to perform the types of function you will require the most and how familiar the terminology used is. It is also worth noting that familiarity with a system inevitably leads to certain things being taken for granted, so if the demonstrator is using jargon that you do not understand, it is almost certainly unintentional. Keep asking for explanations whenever anything remains unclear, and if in doubt about a certain feature or capability, ask to see it demonstrated.

Yasmin Hashmi is a partner in SYPHA, independent consultant and publisher of The Tapeless Audio Directory. The 7th edition of this buyer's guide includes details on over 500 tapeless systems aimed at professional audio applications, and includes technical specifications, typical configurations and costs, and suppliers details worldwide. For more information, e-mail sypha@compuserve.com or telephone +44 181 761 1042. The Tapeless Audio Directory can be ordered directly from Primedia Intertec at 1-800-543-7771.

Company	Product	# of tracks — real and virtual	# of I/O channels	Compression	Storage capacity in minutes	Storage expandable	External synchronization, Type	RS Number
360 Systems	ShortCut	Two real	2x2	No	230@48KHz, 240@32KHz	Yes	Yes	Circle (260)
AMS Neve	AudioFile 98	32 real	16x32	No	12 hours	Yes	Yes, Sony protocol	Circle (261)
Akai	DD1500	12	2x2, 4x8	No	13 hours	Yes	Yes, time code	Circle (262)
Arrakis	DL4	Two real	3x1	Yes	2,982	Yes	No	Circle (263)
Arrakis	TS3	Eight virtual, two real	2x1	No	559	Yes	No	Circle (264)
Cartworks	Digital Audio Systems	Four real	12x12	Yes, MPEG Layer II, MPEG Layer III, WAV	2700 uncompressed, 224 MPEG Layer II, 640 dependent on bitrate	Yes	No	Circle (265)
DigiDesign	Pro Tools 24 MIX, Pro Tools 24 MIXplus	64 real, 128 virtual	two-72	No	200	Yes	Yes, MIDI	Circle (267)
Digital Audio Research/Studer	OMR8	Eight real	8x8	No	3480	Yes	Yes, time code	Circle (268)
Digital Audio Research	SoundStation Gold	up to 64	64x64	No	180	Yes	Yes, time code	Circle (269)
Fairlight USA	DaDplus	24	two-12	No	160 hours	Yes	Yes, time code	Circle (270)
Fostex	DMT-8VL	Eight	8x8	No	60	Yes	Yes, MIDI sync	Circle (271)
Fostex	D-90	Eight	8x8	No	60	Yes	Yes, time code	Circle (272)
Fostex	D-160	Sixteen	16x16	No	30	Yes	Yes, time code	Circle (273)
Orban	Audicy	10 real, 24 virtual	2x2	No	35	Yes	Yes, time code	Circle (274)
Otari	PD-80	Eight	8x8	No	120	Yes	Yes, time code	Circle (275)
Roland	VS-840EX	Eight real, 64 virtual	8x6	Yes, RDAC	187, 258	Yes	No	Circle (276)
Roland	VS-880EX	Eight real, 128 virtual	8x6	Yes, RDAC	1782, 1938, 2673	Yes	Yes, MTC	Circle (277)
Roland	VS-1680	16 real, 256 virtual	11x10	Yes, RDAC	2226, 2424, 3342	Yes	Yes, MTC	Circle (278)
SADiE	Artemis	24-90	32x32	No	840	Yes	Yes, Audio genlock	Circle (279)
Soundscape	R.Ed	32 real, 64 virtual	28x28	No	230 hours stereo	Yes	Yes, MIDI	Circle (280)
Tascam	MMR-8/MMP-16	Eight/16	8x8, 16x16	No	180	Yes	Yes, time code	Circle (281)
Yamaha	DSP Factory	16 real, # of virtual tracks varies with software	4x4, 8x8, 16x16	No	Dependent on host computer	Yes	Yes, SMPTE to MIDI interfaces	Circle (282)
Yamaha	D24	Eight real, 56 virtual	2x2	No	120	Yes	Yes, SMPTE , serial TC, MTC, D24 remote sync	Circle (283)

Synchronicity can signal a life change ahead

KARE ANDERSON

It was a day no one in Beatrice, NE, will ever forget. On March, 1,1950, all 15 members of a church choir were due at practice at 7:20 p.m. The minister and his family were delayed when his wife decided to re-iron their daughter's dress. Another girl took longer than she expected to complete her geometry homework; still another couldn't get her car started. Two others lingered to hear the end of an especially exciting radio program; one mother and daughter were delayed when the daughter was late waking from her afternoon nap; and so on. The 10 separate and quite unconnected reasons for 15 responsible people all to be late that one night seemed quite ordinary.

Fortunately, none of them arrived on time. At 7:25 p.m. the church building was destroyed in an explosion. The story was covered by *Life* magazine, and mathematician Warren Weaver recounted it in his book, *Lady Luck: The Theory of Probability*, calculating the staggering odds against the chance for this uncanny event as about one in one million.

In this real-life story, coincidences changed lives. Some coincidences are almost too purposeful and too orderly to be a product of random chance - but then how do we explain them?

Everyone's life is based on story-telling

Each of our lives is a story. Synchronistic events – coincidences that have great meaning for the people who experience them – call attention to the structure of the story we are living. What if you were a character in the story of your life, but not the only author? When external events so precisely mirror our own inner state that the impact of a coincidence cannot be ignored or its significance denied, and our lack of control over the events is indisputable, we are faced with the question: If I am not the author of my story, who is?

Synchronicity: the story of our times

Synchronicity is emerging as a phenomenon from many directions of study as diverse as quantum physics, medicine and astronomy. As Arthur Koestler observes in his book *The Roots of Coincidence*, synchronicity reflects the presumption of a "fundamental unity of all things" which transcends mechanical causality and relates coincidence to the "universal scheme of things."

The fear of losing control

Synchronous events can be unnerving because they show we do not have complete control over our life patterns, and we, like all animals, fear the apparent loss of control in our lives. The fear of losing control (as when we experience coincidences that cannot be explained) makes our emotional lives threatening to our rational minds.

What can you do?

- Have a clear vision of your path in life and be open to seeing the coincidences that tell you to consider another direction.
- Notice how meaningful coincidences reveal your inevitable connection with everyone, even those you do not know.
- Be aware that every action you take has immediate and continuing effects on many people, even those you might never meet face to face.
- When coincidences happen, especially those that have an emotional impact, consider what special meaning they have for you regarding your beliefs, especially about who you are and what you should or could be doing.

Prepare yourself for change

Synchronistic events are often wake-up calls for you to make a change in your life. How do you work with synchronicity? Be open to the meaning in what you did not want to happen. Set aside your agenda, and consider that your story should take a different turn.

Be open to change and the closer connection it brings

Every movement forward in your life has three parts:

1. We recognize that the current situation no longer fits or works. An event can make this clear.
2. We enter a state of confusion and transition. We imagine how things might be different.
3. Something happens. We take some action, and we move to a different, more satisfying way of being.

Our lives are full of meaningful events we deliberately set out to cause for ourselves in pursuing work and relationships. These are intentional actions. When an accidental twist of fate reorganizes our lives and shows us something we did not expect, we have a choice:

1. Numb out, ignore it, and move on so we'll bump into a variation of it again and again, until we take notice.
2. Notice what it means for us and become more truly alive. ■

Kare Anderson is a speaker and author.

SEND Send questions and comments to: kare_anderson@intertec.com

Business Wire

Business highlights from broadcast and production

BY SANDRA FERGUSON, EDITORIAL ASSISTANT

Four television affiliates selected Wheatstone audio consoles: Fox network's KTVI and Gannett's KSDK installed TV-1000 consoles; St. Louis market's WB affiliate, KPLR, chose the SP-8 for its new broadcasts and KDNL, an ABC affiliate, selected a SP-5A console for its news.

HBO chose Evertz to provide the terminal equipment for the HBO Communications Center's HD network.

Tektronix announced that four Grass Valley Model 4000-3 production switchers will be installed in CNN's Atlanta-based facility.

Tiernan announced that, beginning in May 1999, it will integrate NagraVision's ATSC 2500 Conditional Access System in its digital TV systems.

Leitch's VR300 servers will be integrated into the CNN News Group's new central content management system.

Panasonic announced that more than 70 U.S. TV stations placed orders for its AJ-HD150 DVCPRO HD studio VTR during NAB99. In related news, Sinclair Communications' WSYX-TV, the ABC affiliate in Columbus, OH, pur-

Screen Shot

WFSB-TV covers University of Connecticut's NCAA win with Panasonic's DVCPRO

The University of Connecticut's hometown CBS affiliate, WFSB-TV, Channel 3 in Hartford, used Panasonic's DVCPRO to cover UCONN's win at the NCAA's Final Four championship. DVCPRO is the station's exclusive ENG format. Earlier this year, WFSB completed its transition to DVCPRO for digital news operations. In purchases valued at close to $1 million, the station bought 13 AJ-D810 1/2" 3-CCD camcorders, three AJ-LT85 laptop editing systems and dozens of DVCPRO VTRs, including AJ-D750 and AJ-D650 studio editing VTRs, AJ-D640 recorder/players and AJ-D230 desktop VTRs.

chased more than $1 million of Panasonic's DVCPRO equipment for news and programming operations.

JVC announced that Fox Television credited its DIGITAL-S (D-9) videotape format with saving the company more than $33 million since its adoption as the house videotape format for Fox News Channel and Fox SportsNews and the archive standard at the Fox Network Center. Fox purchased more than $3 million worth of new JVC four-channel audio equipment.

PBS' program distribution plant was upgraded by Communications Engineering Inc. with a new digital signal infrastructure and an automated, multichannel solution.

Odetics announced the sale of its first TCS90-PRO Automated Tape Library to Turner Entertainment Networks for use at Turner South, a new regional entertainment service.

Harris is providing its Sigma CD-II UHF digital TV transmitters to two Raleigh, North Carolina TV stations—WRAL-TV and WRAZ-TV.

Pluto Technologies announced an alliance with Sundance Digital. This alliance will ensure full compatibility between Pluto's AirSPACE multichannel broadcast server and Sundance Digital's FastBreak NT spot insertion software.

Quantel recently opened its new Canadian sales headquarters in Toronto.

Avid and Sony announced an agreement to create an alliance to pursue the development of new post-production and broadcast news products. This agreement includes creating an Avid nonlinear news editing system that will interoperate with Sony's new line of MPEG-based broadcast equipment.

Chyron announced a joint marketing relationship with Nexus ASA Group and its subsidiaries, Nexus-Informatics GmbH and NewsMaker Systems, Inc. Under the agreement, both companies will market the integrated Nexus OpenMedia/StarDrive and Chyron Duet solution.

People

John Turner, president of Turner Engineering Inc., received the 1999 NAB Television Engineering Achievement award and Geoffrey N. Mendenhall, Harris Broadcast Systems division vice president for Advanced Product Development, received the 1999 NAB Radio Engineering Achievement award on April 20 in Las Vegas.

John Turner

Geoffrey N. Mendenhall

ESPN promoted Charles (Chuck) Pagano to senior vice president of technology, engineering and operations.

Pilot Broadcast Systems AS, headquartered in Bergen, Norway, announced the establishment of its North American operation, Pilot Broadcast Systems USA. Isaac Hersly has been appointed president and chief executive officer of the North American division.

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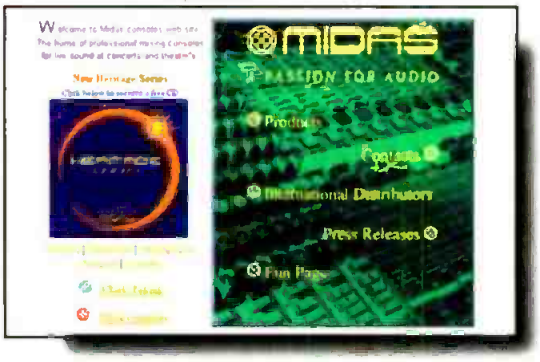
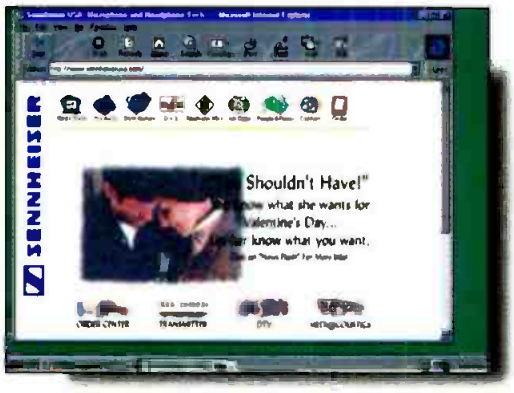


www.midasconsoles.com

Midas have been manufacturing high-quality, flexible and sonically superior audio mixing consoles for nearly 30 years. They also offer instant service backup and an amazing three year warranty on all products.

www.technicalpress.com

Technical Press is a web-based reference site that supports more than a dozen video engineering books, including *DTV: The Revolution in Electronic Imaging*. Also available are articles on digital video technologies and applications, and a detailed series on the history of broadcast engineering.



www.sennheiserusa.com

Sennheiser: Established in 1945 in Wedemark, Germany, Sennheiser is an Oscar and Emmy award-winning leader in microphone technology, RF-wireless and infrared sound transmission, headphone transducer technology, and most recently in the development of active noise-cancellation. The company is driven by an innovative and pioneering spirit and is committed to ongoing research, precision engineering and meticulous manufacturing standards.

www.winsted.com

Winsted Corporation: Winsted offers a full line of modular consoles, rack cabinets, file server workstations, tape storage, and editing desks. The most complete line of accessories in the industry complement this extensive offering. Winsted's 164-page fully illustrated catalog includes an easy-to-understand modular components section that allows you to design your own console, or you can receive a free consultation with a Winsted's system design engineer. To receive a free catalog or learn more about Winsted at their website www.winsted.com or call toll free at 800-447-2257.

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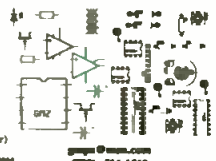

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Classifieds

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WDAY-TV: Has an opening for a Broadcast Engineer. The position is for a technician in electronic repair. Experience in the field of broadcasting preferred. Person must have: 1) Minimum 2 years degree or experience in electronics. 2) Must be good with computers. 3) A good driving record. Send resume to Tom Thompson at WDAY-TV, Box 2466, Fargo, ND 58108 or Fax 701-241-5368. E.O.E.

ENGINEERING TECHNICIAN: WIFR-TV is seeking an Engineering Technician with a minimum of 2 years experience in electronics with a strong emphasis in digital electronics and computer/LAN based systems. Must be able to maintain and repair all broadcast related equipment to board level. UHF transmitter and RF experience a plus. Send resume to: Chief Engineer WIFR-TV P.O. Box 123, Rockford, ILL 61105. No Phone calls please. EOE.

CHIEF ENGINEER - Television. Non-tenure-track. Primary duties include maintenance and repair of two computer labs, audio production facility, television studio, TV control room and video editing suites. Duties also include inventory, equipment checkout, and possible course instruction. The successful applicant will need to know how to install and configure networking protocols. P.E. certification and Electrical Engineering degree required. Twelve-month appointment. Salary commensurate with experience. Applications will be reviewed beginning May 15, 1999, and will be accepted until the position is filled. The successful candidate will begin in August 1999. Applicants should provide a letter of application providing specifics regarding their professional and academic experience; a resumé or curriculum vitae; and the names, addresses, and current telephone numbers of at least three references. All materials should be sent to: Search Committee Chair for Chief Engineer - Television, Department of Communication, The University of Southwestern Louisiana, Post Office Box 43650, Lafayette, LA 70504-3650. The University of Southwestern Louisiana is an Equal Opportunity / Affirmative Action Employer (LA 7-98). Women and minorities are encouraged to apply.

CHIEF ENGINEER - UHF CBS Affiliate with AM/FM seeks a leader with strong management skills to manage the station's engineering staff. This is a terrific opportunity to be part of a highly aggressive management team at a progressive, innovative television station. We are looking for a candidate who has extensive experience in transmitter, and microwave systems maintenance, including at least three years of experience in broadcast television engineering management. AM directional experience a plus. This individual will prepare and administer capital and operating budgets, and plan equipment purchases and installation. Send resume and application to: Sue Sylvester, WMBD-TV, 3131 N. University St., Peoria, IL 61604. EOE M/F

PRODUCTION SUPERVISOR: NEWSCHANNEL 8, the DC-metro region's only 24-hour local news source, is looking for a *production supervisor* to lead its Production Team. For more information, please check the joblink at www.newschannel8.net. To apply, please send a cover letter to resume to Director, Human Resources, NEWSCHANNEL 8, 7600 D Boston Blvd., Springfield, VA 22153 or fax to (703) 913-5436. No telephone calls, please. EOE.

ENGINEER: Roland House, a full service postproduction facility in Arlington Virginia has an opening in its Engineering Department. We are an entirely component digital facility with 35,000 square feet of space, just across the Potomac River from Washington DC. We offer audio, linear online editing, graphics design, non-linear editorial (Avid and Smoke/Flame), and film transfer. In addition, we are on the frontlines of HDTV, having one of the first HD edit suites, and color correction suites in the country. We are seeking a highly motivated, self-starter to join our team. Applicants should have experience in analog and digital systems, broadcast VTRs (Beta SP, Digital Beta preferred), editing equipment, production switchers, and digital effects. Will be responsible for installation, repair and preventative maintenance on all of the equipment in the facility. Understanding of production workflow and IT experience a plus. Competitive salary, excellent benefits package. Please send resume to Vince Forcier, Roland House Inc., 2020 N 14th St. Suite 600, Arlington, VA 22201.

Classifieds Help Wanted

Broadcast Engineers

STUDIO MAINTENANCE ENGINEER- Must be able to perform the following duties: install and maintain studio transmission equipment including video switchers, audio consoles, DVE, CG, SS cameras and robotics. Familiarity with automation systems and master control environment. Should possess a general computer/networking systems and master control environment. Must be able to work on a rotating shift schedule. **Position Code SME**

IT ENGINEER- Must be able to install and maintain broadcast computer based equipment. Applicants should have a basic knowledge of video/audio systems in a television environment. Experience working with Tektronix Profiles, Avid Media Composer and HP Mediastream systems is essential. Must be proficient with PC hardware, server and network architecture. Possess knowledge of Newsroom computer systems and non-linear editing. Expertise in various operating systems for MAC and PC based platforms. Please include salary history/requirements. **Position Code ITE**

RF MAINTENANCE ENGINEER- Must be able to perform the following duties: install and maintain RF related equipment in a studio, transmitter and remote site environment. Must be able to work on VHF/UHF solid state transmitters and all associated transmitter equipment. Ability to align and repair microwave TX/RX and all wireless equipment such as microphones and IFB. Knowledge of FCC rules and regulations. You must possess knowledge of analog/digital systems and a minimum of five years broadcast television experience. Applicants must be able to do component level repair and work well under pressure. **Position Code RFM**

Candidates should have an engineering degree or equivalent technical training. SBE/FCC certification is a plus. If you want to be a part of the exciting transition to HDTV in the most exciting city in the world, please send your resume and cover letter (with position code) to **Kurt Hanson, WABC-TV, 7 Lincoln Square, New York, NY 10023.** No telephone calls or faxes please. We are an equal opportunity employer.

abc 7

Mayo Clinic Scottsdale

Broadcast Engineer

Live, Work and Play in Beautiful Scottsdale, Arizona!

The world renowned Mayo Clinic in Scottsdale, Arizona is currently accepting resumes for the position of Broadcast Engineer to support its ongoing video production and teleconferencing programs.The qualified candidate will be a self-starter and creative thinker who possesses a knowledge of satellite and terrestrial communication systems, knowledge of computer systems and networks, and a familiarity with video production facilities.

For consideration, please send resume and cover letter to: **Mayo Clinic Scottsdale, Human Resources Department, 13400 East Shea Blvd., Scottsdale, AZ 85259. Or email in text format to: vanloon.ingrid@mayo.edu (resumes only).**

As an equal opportunity employer, we value diversity. Mayo Clinic Scottsdale conducts reference and background checks; drug testing is required of all new hires.

mayo

E! ENTERTAINMENT TELEVISION.

E! Entertainment Television, an international cable network, has the following career opportunity available in our Los Angeles headquarters:

Director, Engineering

Individual will oversee the day-to-day operations of the Engineering Department including managing systems design, installation, trouble-shooting and training. Minimum 5 years broadcast/cable related management experience required. Familiarity with overall system layout of a network including Master Control, Studio, and Post Production. Experience with Video Disk Servers, CCIR 601 digital format and digital equipment required. Bachelor degree in Engineering or equivalent desired. SBE certification preferred.

Excellent health benefits package, flexible spending and 401(k) Savings Plan. Please send resume with salary history to:

E! Entertainment Television
Attn: Human Resources
5670 Wilshire Blvd.
Los Angeles, CA 90036
E-Mail: hr@eentertainment.com
Fax to: (323) 954-2888
Equal Opportunity Employer

NEWS PROMOTION DIRECTOR: WBTV, CBS affiliate in Charlotte, NC, seeks creative, hands-on talent to lead our great team of news promotion producers. Need strategic thinker with solid marketing judgement, strong conceptual, writing and producing skills, and good sense of graphic design. Must have good people skills and collaborative communication style. Great station, great town, great opportunity to grow. For employment consideration at WBTV, a superb technical facility and one of the nation's premiere CBS affiliates forward resume to Cathy Lockhart Cloud WBTV, One Julian Price Place, Charlotte NC 28208 fax 704-374-3626. ccloud@jpc.com. Jefferson-Pilot Communications is an equal opportunity employer.

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Classifieds Help Wanted

Broadcast Engineers

QVC, Inc., the world leader in televised shopping, seeks talented television broadcast engineers to maintain our state-of-the-art digital broadcast facility at Studio Park (our corporate headquarters), the QVC Local (our remote vehicle) and Pioneer Studios (our Post Production facility).

Uplink (EIC) Engineers

QVC currently has excellent opportunities available for Maintenance and Uplink (EIC) Engineers with 5 to 7 years experience. Reporting to the Manager, Systems Support, the successful candidates will supervise technical operations for remote broadcasts (equipment set-up, maintenance and repair, uplink/downlink set-up and operation) as well as provide technical support to QVC's live broadcast and post production facilities. Other responsibilities include: assisting with set-up and breakdown of equipment; technical performance logging and systems maintenance; resolving complex technical problems including those related to graphics computers, transmitters, switchers, receivers, cameras, VTRs; and monitoring video and audio transmission quality. Travel required for 25% of the year. The professionals we seek will possess: AS in Electronics or equivalent combination of training and experience; demonstrated knowledge of video and audio equipment and systems, component level troubleshooting, TV systems design and installation; and competence in dealing quickly with critical problems that occur during live broadcast situations. SBE Broadcast Engineer certification or FCC general class license preferred. Must have experience with set up and maintenance of Sony triax cameras, switchers, Betacam VTRs, audio equipment, PCs and modems and cellular communication.

Maintenance Engineers

Reporting to the Manager, Systems Support, the successful candidate will be responsible for repairs of broadcast equipment including digital/analog beta decks, cameras, routers and switchers. Ability to troubleshoot to the component level, detailed knowledge of non-linear editing systems, and strong computer skills (PC, Mac, Windows NT, UNIX and LAN hardware and software) required. Camera robotics experience is a plus.

QVC offers a state-of-the-art environment, room for personal and professional growth, competitive salaries, and comprehensive benefits. Join the nation's #1 electronic retailer as we continue to change the way the world shops! Interested individuals may forward a resume to: QVC, Inc., Human Resources - JE/BE/ENG, 1200 Wilson Drive at Studio Park, West Chester, PA 19380. Fax: (610) 701-1150. Visit us online at www.qvc.com. Equal Opportunity Employer. Drug Free/Smoke Free Work Environment. Pre-employment drug screening required.

QVC®

a great place to work

TELEVISION ENGINEER II, KRWG-TV: Full-time Television Engineer II at New Mexico State University, KRWG-TV. $23,539.32 minimum. Position is contingent upon funding. Education: two years technical training in television operation and maintenance or Associate Degree in Electronic Technology. Experience: three years experience in the installation, operation, and maintenance of Studio and RF broadcast television equipment or any equivalent combination of education and experience. Special requirements: FCC Restricted Radio-Telephone permit; willingness to travel to remote transmission sites; perform heavy manual labor; and work under adverse weather conditions. Prefer FCC General Class Radio-Telephone license, SBE and/or NARTE technical certification. Send cover letter, resume, & three references to: Personnel Office, Dept. 5273, NMSU, Las Cruces, NM 88003. Deadline 5:00 PM, June 18, 1999. NMSU is an EEO/AA employer. Females and minorities encouraged to apply. Offer of employment contingent upon verification of individual's eligibility for employment in the United States.

BROOKDALE COMMUNITY COLLEGE

TV MAINTENANCE TECHNICIAN

(Sr. Specialist, Telecommunications)

REVISED AND EXTENDED SEARCH

One of the nation's most innovative community colleges, seeks an individual to assist in the design, installation, repair and maintenance of all Telecommunications production and instructional equipment. The successful candidate will have a Bachelor's degree in Telecommunications, Electronics or related field, and two to three years related experience. We will consider an equivalent combination of education/ experience, related to the maintenance/ operations of telecommunications equipment and systems. A valid driver's license is required. Position requires individual to be 'on call' 24 hours a day. Overtime may be required to complete special projects. Annual salary range is $23,753 - $32,000, depending on related education and/or work experience (subject to current College contract negotiations).

You may apply in person at the Human Resources Office 8:30 AM to 5:00 PM Monday - Friday, or send your resume to:

BROOKDALE COMMUNITY COLLEGE
765 Newman Springs Road, Lincroft, NJ, 07738
Attn.: Human Resources Dept.

A review of applications will begin June 15, 1999 and continue until the position is filled.

Brookdale Community College is an Equal Opportunity/Affirmative Action Employer and its staffing process is pursued through an unwavering commitment to diversity, not only as a compliance responsibility, but as an active conscious effort to build and develop diversity within the faculty and staff.

SONY

Contract/Consultant Opportunities

Always wanted to work with an undisputed World Leader? Here's a chance to work with the best in the business. Opportunities available immediately for state-of-the-art turnkey broadcast production and play-out projects. Requires full time presence at Sony's facilities in San Jose, CA, to start. Travel to job site will be required, especially during the installation and testing stages of the project.

Sr. Level Video Systems Design Engineer

Job Code: BEM-LM-7704233

Job requires 5+ years' professional exp in the design, operation, testing and maintenance of large scale digital video and audio production and broadcast facilities. Job duties focus on the design of floor plans, equipment rack and patch bay elevations; and signal flow diagrams. Must be computer savvy, have in-depth knowledge of MS Windows and Excel, and have a strong electronics background. AutoCAD, LAN/WAN, ATSC, MPEG-2, AC-3 and video server experience a plus.

Project Managers

Job Code: BEM-DO-7704233

Job duties focus on the management of resources to execute fully-integrated broadcast systems. Must complete projects on time and within budget using your 5+ years' exp in project management in broadcast/production systems.

Please forward your resume, indicating job code, to: Sony Electronics Inc., 3300 Zanker Road, MD #SJ2C2, San Jose, CA 95134-1901. Fax 408/955-5166 or e-mail sj_jobs@mail.sel.sony.com. EOE/M/F/D/V

www.sony.com/jobs

Check out the *Broadcast Engineering* web site for career opportunities! www.broadcastengineering.com

Classifieds Help Wanted

TURNER STUDIOS

DIRECTOR OF TECHNICAL OPERATIONS

Reports to VP of Engineering for Turner Studios. Responsible for technical readiness of Turner Studios. Must have proven engineering management skills and ability to consolidate varied Turner Studios Engineering departments and activities. Ability to manage an overview of Turner Studios Engineering global needs, and present strategic and unified solutions. Must have the ability to create engineering project budgets and timelines, and track related accounting details. Experience in television systems design/installation, and television systems engineering/maintenance a must.

Minimum of five years experience at network level television engineering or post/production engineering, with a minimum of a two-year associate degree in electronic technology or equivalent. Must be a resourceful self-starter with ability to make decisions. Must have ability to find creative solutions to television problems. Must possess good organizational skills and be capable of reviewing and supervising management-level engineers.

Please send all contact information to:

Kevin B. Shorter
Vice President of Engineering
Turner Studios
1050 Techwood Drive NW
Atlanta, GA 30318

TURNER STUDIOS

ENGINEERING/MAINTENANCE

Turner Studios is building a world-class digital post/production facility and has the following positions available:

MANAGER OF STUDIO ENGINEERING
Min. 5 years exp. in managing live television production events.

MAINTENANCE ENGINEER - EDITORIAL
Maintenance in an edit-support role. Tape maintenance exp. desired. Troubleshooting to component level. Min. 5 years exp.

MAINTENANCE ENGINEER-GRAPHICS/EFFECTS
Maintenance exp. in graphics-related television environments. Computer networking exp. a plus. Troubleshooting to component level. Min. 5 years exp.

Come be a part of our team!
Kevin B. Shorter
Vice President of Engineering
Turner Studios
1050 TechWood Drive NW
Atlanta, GA 30318

CNN
THE WORLD'S NEWS LEADER

ENGINEERS

Turner Broadcasting System has career opportunities for experienced television engineers. These career positions demand an extensive background in equipment maintenance, digital video and audio, and knowledge of computer systems and networks. Please mail or fax your resume and cover letter to:

Jim Brown, Assistant Vice President of Engineering Services
Turner Broadcasting System, Inc.
One CNN Center • P.O. Box 105366
Atlanta, GA 30348-5366
Fax: 404-827-1835 • Phone: 404-827-1638
TBS is an equal opportunity employer

REMOTE ENGINEER: for state-of-the-art remote unit. Must have extensive experience in the operation of television production equipment and a strong background in component level maintenance. Must be able to work well with people and provide technical leadership for remote television production. Competitive salary and benefits. Send resume and references to: Technical Manager, Jefferson-Pilot Sports, 1 Julian Price Place, Charlotte, NC 28208. Jefferson-Pilot Communications Company is an equal opportunity employer.

TV NEWS PRODUCER: We need an experienced TV News Producer. Large CBS affiliate in dynamic Charlotte, NC is looking for a line producer with strong writing, excellent news judgement and great people skills. We have all the toys, and a talented staff. We have a rich tradition and an emphasis on quality. If you know how to put together a show that informs, entertains and movies people, send us a tape of your last newscast Minimum 2 years experience preferred. Cathy Cloud, WBTV One Julian Price Place, Charlotte NC 28208. (no phone calls please.) Jefferson-Pilot Communications Company is an equal opportunity employer.

BROADCAST MAINTENANCE ENGINEER: for Public TV/Radio in a great climate with entertainment, sports, and cultural activities for all ages. Repair and adjust equipment and assist in construction of new equipment or modification of existing facilities. Assist remote production team. FCC general radiotelephone operator license, background in analog and digital troubleshooting required. Resume to: Human Resources, WMFE, 11510 East Colonial Drive, Orlando, FL 32817, or fax to 407/206-2791. EOE.

Ad Index

	Page Number	Reader Service Number	Advertiser Hotline
Acrodyne Comm.	149	71	800-523-2596
Adaptive Broadband	151	80	800-490-5700
ADC Telecommunications	31	8	800-726-4266
ADC Telecommunications	141	78	800-366-3891
ADC Telecommunications	153	82	724-941-1500
AJA Video	24	16	530-274-2048
Angenieux	155	83	201-812-3858
Audio Precision	15	5	800-231-7350
Audio-Technica U.S.	89	41	330-686-2600
Azden Corporation	163	87	516-328-7500
BARCO Inc.	101	45	770-218-3200
Beck Associates	192	152	888-422-8600
Benchmark Media Systems	189	101	800-262-4675
B&H Photo-Video	184-187	89,90	800-947-9928
Bogen Photo Corp.	112	48	201-818-9500
Broadcast Microwave Serv.	66	29	619-560-8601
The Broadcast Store	192	153	818-551-5858
Broadcast Video Systems	158	85	905-764-1584
Calrec Audio Ltd.	23	14	142-284-2159
Canare USA	57	34	800-321-4388
Columbine Systems	152	81	303-237-4000
Comark Communications	113	49	413-569-5939
CommScope	95	38	800-982-1708
Computer Assisted Tech.	173	94	212-687-2226
CPI Eimac Div.	147	69	415-594-4000
Datatek, Inc.	143	67	800-882-9100
Dielectric	90-91	42	207-655-4555
Digital.com	192	154	301-571-0790
DNF Industries	26	19	818-252-0198
Dolby Labs Inc.	35	21	415-558-0200
DPS	27	17	606-371-5533
Drastic Technologies	157	84	416-255-5636
Duracell USA	40-41	30	800-548-5489
EEV Inc.	127	52	914-592-6050
ESE	120	60	310-322-2136
Extron Electronics	71	40	714-491-1500
Fantozzi Company	191	151	408-297-2700
Farouqia Laboratories	111	47	408-735-1392
For-A Video	58-59	35	352-372-0270
For-A Video	188	97	352-372-0270
Forecast Consoles	102	46	516-253-9000
Fujinon, Inc.	119	59	972-385-8902
Gennex Communications	22	7	800-945-7730
Global Microwave Systems	140	79	760-631-8021
Harris Corp./Broadcast Div.	3	4	606-282-4800
Hamlin	108	57	615-370-9001
Henry Engineering	190	103	626-355-3656
Herman Electronics	188	95	305-477-0063
Hewlett Packard	103	54	800-452-4844
Holaday Industries	26	18	612-934-4920
Horita	158	86	949-489-0240
Intertec Publishing	162		800-288-8606
Intertec Publishing	178		800-288-8606
Itelco	63	26	303-464-8000
ITS Integrated Tracking Sys	188	96	718-217-8678
Jones Earth Segment, Inc.	191	150	303-784-8809
JVC Professional Products	45	32	800-JVC-5825
KTech Telecommunications	188	98	818-361-2248
LDI '99	177		800-288-8606
Leader Instruments Corp	123	105,106	800-645-5104
Leitch Incorporated	36-37	22	800-231-9673
Leitch Incorporated	200	3	800-231-9673
Louth Automation	61	36	415-843-3665
MGE UPS Systems	137	76	714-557-1636
Miranda Technologies Inc.	11	12	514-333-1772
Modulation Sciences	159	72	800-826-2603
Multidyne Electronics	189	102	800-4TV-TEST
NDS America	65	28	714-725-2500
News World	175		+441714910880
Nucomm Inc.	105	55	908-852-3700
NVision Inc.	116-117	51	530-265-1000
Odetics Broadcast	13	13	800-243-2001
Panasonic Broadcast	4-5		800-528-8601
Panasonic Broadcast	67		800-528-8601
Pesa Switching	47	23	800-328-1008
Philips Digital Video	7	10	800-962-4287
Philips Semiconductors	68-69	37	
Pinnacle Systems Inc.	106-107	56	650-526-1600
Pluto Technologies	131	64	303-402-9000
Prime Image Inc.	93	43	408-867-6619
Prof. Communication Sys.	55	33	813-888-5353
Prof. Audio Supply	173	93	903-737-8478
Quantegy Inc.	125	63	770-486-2800
Quantel Ltd.	28-29	20	446-354-8222
Ross Video	133	66	613-652-4886
Ross Video	144-145	68	613-652-4886
Sachtler Corp	17	6	516-867-4900
Sea Change	33	9	508-897-0100
Sencore	135	75	800-SEN-CORE
Shively Labs	165	104	207-647-3327
Shook Electronics USA	188	99	210-651-5700
Sierra Design Labs	121	61	702-831-7837
Sigma Electronics	139	77	717-569-2681
Silicon Graphics	109	58	800-636-8184
Snell & Wilcox	48-49	24	408-260-1000
Snell & Wilcox	128-129	53	408-260-1000
Sony Electronics	19-21		800-635-SONY
Sony Electronics	97		800-635-SONY
Sony Professional Tape	39		
STB Systems	162	74	972-234-8750
Swager Communications	189	100	800-968-5601
Tadiran Scopus	115	50	
Telecast Fiber Systems	169	91	508-754-4858
Telemetrics	25	15	201-848-9818
Telestream	99	44	530-470-1300
Telex Communications	171	92	800-392-3497
Thomson Broadcast	161	73	800-882-1824
Tieman Communications	9	11	619-587-0252
Trompeter Electronics	98	39	818-707-2020
Vela Broadcast	51	25	801-464-1600
Vela Research	148	70	727-572-1230
Video Accessory Corp	132	65	800-821-0426
Video International	165	88	516-243-5414
Videotek, Inc.	199	2	800-800-5719
Ward-Beck Systems	64	27	416-438-6550
Wheatstone Corporation	2	1	252-638-7000
Windows to the Web	183		
360 Systems	43	31	818-991-0360

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BROADCAST ENGINEERING is edited for corporate management, engineers/technicians and other management personnel at commercial and public TV stations, post-production and recording studios, broadcast networks, cable, telephone and satellite production centers and networks.

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EOM

Musings from Las Vegas

BY PAUL MCGOLDRICK

Regular visitors to Las Vegas note the continuing growth of the city, both in housing and accommodations, and wonder where all the people come from and where they get all the extra water they need. Others look at the changing convention scenery — because that is what we are stuck with during our visits.

The main concourse at the Las Vegas Convention Center continues to grow during NAB, but only in terms of how full it can become. With the NAB Store and the International Visitors' area, there is not much crowd space during the peak comings and goings. I am somewhat surprised that the Las Vegas Fire Marshal allows this encumbrance in a public area.

The new North Hall at the LVCC brings the Hilton Hotel a great deal closer, making the non-air-conditioned part of the walk (with a high concentration of cigarette smoke) only about 50 feet. That new hall is also the location of the video-poor exhibitors. No, not companies that produce poor pictures, but rather those companies that have few exhibitor priority points, which are gained only through longevity and the square footage rented – or, sometimes, through company acquisitions.

NAB staff should visit a show like COMDEX . . .

Organizational problems

If one thought that the North Hall was new and smart (although hot), one saw that the second floor press room was its usual NAB mess. It was a garbage area with sticky surfaces everywhere, badly used and poorly provisioned. NAB staff should visit a show like COMDEX to find out how an efficient press room is really run. It was also extremely surprising to see how few companies made use of the opportunity to show their press kits to the media. Although delivery systems for press releases are now mostly electronic, new companies need to push themselves into the forefront by using all possible opportunities.

Those responsible for booth numbering in the LVCC this year should be required to undertake a course in Counting 101. The illogical jump from North Hall to main floor, and from top to bottom on the main floor, amazed me and any number of other confused visitors. It is bad enough that over the years the hall names have changed as if the geography of Las Vegas was in some kind of magnetic imbalance, but it doesn't help for that to be compounded with five digit booth numbers moving geographically as well. There seems to have been an inordinately high turnover of NAB staff during the last couple of years and maybe some of the historical knowledge has disappeared with those changes.

I found it interesting that, during show time, taxis are banned from the LVCC premises. This was an inconvenience for those of us staying at non-NAB hotels (not by choice). Many of us ended up exiting cabs in the middle of the Hilton's driveway and hiking through to the convention center. Of course, you have to wonder just how many Greyhound buses could be in one place to act as hotel shuttle buses anyway. Apparently they found some interesting routes through the Las Vegas resort areas, although there is little opportunity to avoid traffic lights.

There were advances at this NAB. If you believe 75 percent of the press releases before and during the show, the average company entered into mutual relations with three or four other companies to develop something-or-other. In my opinion, these shotgun partnerships – not a shotgun to make it happen, but rather a shotgun's spread of inaccuracy – really show a lack of corporate ability to determine direction and focus.

Finally, a thank-you to the strangers who stopped me in the aisles of LVCC to thank me for this column; the photograph must be pretty accurate. ■

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